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SECTION OF OBSTETRICS AND GYNECOLOGY

Georgian Room, Hotel Statler, Boston,
June 3, 1935, 2 P.M.

PRESIDING:
Dr. Thomas Almy, Fall River, Chairman.
Dr. Charles J. Kickham, Brookline, Secretary.

CHAIRMAN ALMY: The Section will please come to order. The first business of the meeting is the election of officers for next year. I will ask Dr. Bristol, Chairman of the Nominating Committee, to report.

DR. BRISTOL: Charles J. Kickham as Chairman; R. S. Titus as Secretary.

CHAIRMAN ALMY: Are there any other nominations? There being no other nominations, gentlemen what is your pleasure?

A MEMBER: I move that the Secretary cast one ballot.

CHAIRMAN ALMY: It is moved that the Secretary cast one ballot. The Chairman will do it, as the Secretary is modest. All those in favor say Aye. those opposed No. Dr. Kickham is elected Chairman and Dr. Raymond Titus is elected Secretary of this Section for the next year.

I would like to call attention to the notice that is on the top of the piano, as we have no loud speaker. Anyone who discusses will please come forward so that all may hear him.

Dr. Mongan is unavoidably delayed, so Dr. Davis has agreed to read the first paper on the program. The title of his paper is "Diagnosis and Treatment of Lesions of the Cervix Uteri; Illustrated with Lantern Slides." We are very fortunate to have Dr. Davis with us. He has come from Milwaukee to speak to us on a subject on which he has spent a good deal of time and upon which he is an authority. Dr. Davis.

LESIONS OF THE CERVIX UTERI—DIAGNOSIS AND TREATMENT*

BY CARL HENRY DAVIS, M.D.†

THE subject of cervical lesions is so large that little more than a summary of the more important conditions can be presented in a short paper. Unfortunately it is practically impossible to compile statistics which will give a reasonably accurate idea regarding the age incidence or frequency of various lesions. Neither can we speak dogmatically regarding the end results of treatment since this would require following every patient from the time of treatment to the time of her death, a requirement which is obviously impossible. Investigation of the few statistics which have been published indicate that they are not based on accurate investigative methods and that they should be considered as suggestive rather than proved results.

Endocervicitis. Infection of the cervical canal was not recognized as a clinical entity until Stroganoff and Winter in 1896 demonstrated that bacteria are not normally found above the external os. Seven years earlier Winter had determined that the endometrium normally is free from bacteria. Arthur Curtis, in 1918, confirmed Winter's observations regarding the endometrium and added to the evidence showing that the cervical glands are prone to become chronically infected. Laura Moench in 1924, reported that organisms grown from chronically infected cervical glands of patients suffering from chronic arthritis were culturally identical with those commonly found in other chronic foci of infection in arthritis patients and that these organisms when injected according to the technic of Rosenow, would produce joint lesions in rabbits. My own clinical experience indicates that whenever streptococci, especially the viridans type, can be grown from the cervix of a patient with arthritis, cauterization of the cervical glands will be followed by a temporary exacerbation of symptoms. Cleaning up the cervical infection usually is followed by clinical improvement and in a few cases where other foci had been removed previously the degree of relief was beyond expectation.

It may be impossible to prove a clinical connection between chronically infected cervical glands and adnexal disease, yet the relief of symptoms following correction of cervical infections indicates that a definite relationship must exist. Among the symptoms relieved after adequate treatment are dysmenorrhea, dyspa-

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reunia, pelvic tenderness, pelvic pain, lumbosacral backache, menorrhagia, metrorrhagia, and sterility.

Erosions of the Cervix. There is much confusion in our literature due to the differences of opinion regarding ectropion and erosions. Contrary to the teaching in some schools, I am completely in accord with Curtis who reports that careful microscopic study of an adequate number of sections from "eroded" cervices shows that a large percentage are devoid in some areas of an epithelial covering, the surface often being composed of granulation tissue infiltrated with polynuclear leukocytes and extensively invaded with bacteria. There may be a variety of causes but the most important is the irritating discharge from a cervical infection. Correction of the endocervicitis should be followed by epithelialization of the denuded areas. However, in some cases the granulation tissue must be cauterized before proper healing can be secured.

Small exophytic carcinoma diagnosed during a colposcopic examination by Hinselmann. A high amputation of the cervix was performed as the patient was young and desired children.

Ectropion of the Cervix. Colposcopic examinations of the cervix uteri indicate that many women normally have gland openings at some distance from the external os. These should be distinguished from ectropion of the cervical glands associated with lacerations or resulting from an actual eversion or growing out of the glands. A patient may have an erosion superimposed upon an ectropion. Hinselmann recognizes a congenital type of ectropion in his classification of conditions diagnosed with the colposcope, and he does not consider it important so far as cancer is concerned. However, everted glands tend to become infected and the patient may have all of the symptoms associated with endocervicitis.

Lacerations of the Cervix. Childbirth is responsible for most lacerations although some may follow various forms of instrumentation. In general, tears resulting from hasty or improper dilatation, do not show externally although they may cause serious bleeding. As previously stated lacerations result in an eversion of the endocervical glandular tissue which becomes infected. Many of the symptoms associated with old lacerations are those of the associated infection. Most writers assume that lacerations increase the possibility of cervical cancer, but this must be considered a sequela of the chronic irritation of the secondary infection.

Leukoplakia (Matrix) Grade IVb. Carcinoid epithelium with many pathologic mitoses and proliferation into the connective tissue.

It is undoubtedly true that cervical lacerations increase the risk of abortion, but here again it is possible that the chronic cervical infection plays an important rôle.

Stricture of the Cervix. Cervical stricture may follow various forms of trauma, especially that of infection, cauterization, coagulation, conization, chemical cauterization, operations such as amputations or curettage of the cervical glands, radium therapy and occasionally after trauma of complicated labor. While this condition is relatively common, it is preventable following the various types of therapy of endocervicitis provided the patient has adequate office treatment until healing is complete. The cervical canal must be kept open.

Syphilis of the Cervix. Syphilitic lesions of the cervix are rarely observed even by gynecologists of large experience. However, the chancre may be located there and undoubtedly is more often than we realize. Gellhorn, who has written extensively on this subject, reports that the secondary lesions frequently may be found if the syphilitic woman is followed closely, and that the tertiary lesions tend to produce hypertrophy with subsequent necrosis. The gynecologist must realize that gummatous lesions may involve the cervix as well as other organs and be on the lookout for them in syphilitic patients. Syphilis of the cervix and cancer of the cervix may coexist.

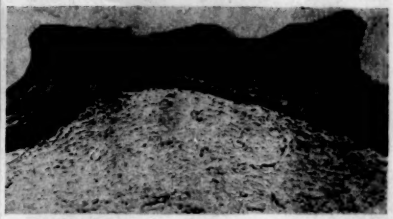
Tuberculosis of the Cervix. Cervical tuberculosis is a rather rare condition as evidenced by the report of Norris who found only four

cases among seventy-four specimens of genital tuberculosis in his laboratory at the University of Pennsylvania. This condition usually is associated with and probably secondary to tuberculosis of the uterine cavity. It has been suggested that it might be primary as a result of a tuberculous man moistening a condom with sputum. The finding of tubercle bacilli is sufficient to make the diagnosis, but if there is any doubt, tissue should be secured for microscopic examination.

Streptothrix Infection of the Cervix. It has been assumed that ray fungus (actinomyces) infections of the genital tract are quite rare but recent observations at the Kingston Avenue Hospital, New York, by Barringer and Thomson indicate that this condition may be responsible for many unexplained cases of ulcerative pathology of the genital tract. In a series of eighty-nine cases diagnosed clinically as gonorrhea, forty-nine patients were found by cultural methods to have the streptothrix organisms. The pathological process in the more severe infections is in inflammation characterized by a tenacious purulent discharge, which is sometimes membranous in type and accompanied by necrosis with considerable loss of tissue. (Barringer.) These observers are preparing a new report which will be published shortly.

Cancer of the Cervix. There are a few phases of the cancer problem regarding which clinicians are agreed: (1) Cancer does not develop in perfectly normal tissue. (2) Various forms of chronic irritation constitute predisposing factors which favor the development of cancer. (3) Every cancer in its earliest stage is a localized microscopic lesion. (4) Most cancers can be cured if diagnosed early and adequately treated.

Notwithstanding the campaigns of education carried out by various organizations during the past decade or two, it is still true that most cancers of the cervix are not seen by a physician until the patient has the symptoms of a late lesion. As a result only a small percentage of permanent cures is obtained. It is obvious that early diagnosis can be assured to any great extent only when women have periodic physical examinations. Furthermore, even though every woman did have a regular examination once or twice each year, the possibility of recognizing a very early carcinoma by palpation or the usual type of inspection is questionable unless the lesion has reached the size of a small pea. Recognition of this fact led Hinselmann to develop his colposcope, by means of which a small carcinomatous ulcer, too small to be seen with the unaided eye, is enlarged to a size which makes its recognition possible. The use of this instrument combined with the Schiller test, which is useful in selecting biopsy material, should enable us to make an earlier diagnosis of cervical carcinoma than was formerly possible in the examining room. Hinselmann in a recent letter informed me that he now has "136 cases of beginning cancer detected only by the colposcope". Cancer is an easily curable disease if diagnosed and treated while the lesion still is microscopic.



Leukoplakia (Matrix) Grade II. This is from a very small diseased area. The growth in this case was exophytic. Colposcopic diagnosis—leukoplakia.

Diagnosis of Cervical Lesions. Several of the more common conditions involving the cervix uteri have been discussed briefly in the first part of this paper. Diagnosis of the actual lesion may depend on palpation, inspection through the speculum with the unaided eye and the colposcope, wet and stained smears, cultures, blood tests for syphilis, and a study of biopsy material. Only with experience may a clinician decide which procedure may be omitted during the examination of any patient. A large portion of serious mistakes result from failure of clinicians to use even the simple easily accomplished office procedures. It is distressing to find that many of our ablest internists commonly neglect inspection of the cervix when they make a "thorough" examination of a woman patient. Every gynecologist has seen a considerable number of women who have been under more or less constant supervision of a family physician or a medical specialist during the time when a cancer of the cervix was passing from a curable to a hopeless condition. It is regrettable that we still see far advanced cancer of the cervix in women who have had a subtotal hysterectomy a few months previously for fibroids or some other pelvic condition without any record to show that the cervix had ever been examined prior to the abdominal operation. (Points in diagnosis were shown in lantern slides.)

Diagnosis with the Colposcope. Considerable experience with the colposcope is necessary before one may use it satisfactorily in the diagnosis of cervical lesions. First one must obtain an accurate knowledge of the varied but essentially normal physiologic structure of the cervix uteri. This accomplished, variations from the normal may be recognized and diagnosed quite accurately. Hinselmann is convinced that with

the colposcope it should be possible to recognize an exophytic carcinomatous proliferation even if only one papilla should be involved, but such a finding would be exceedingly rare since more than one usually is involved. An endophytic carcinoma is recognized with greater difficulty since the growth is inward and the diagnosis must depend on the size of the overlying ulcer and the type of the secretion. Larger ulcers have a very characteristic appearance showing areas of necrosis, yellowish nests of cancer cells, and blood vessels running longitudinally, but it is almost impossible with the colposcope to differentiate a true erosion and a carcinomatous ulcer. It must be appreciated

Leukoplakia (Matrix) Grade I. Atypical hornified epithelium. Colposcopic diagnosis—leukoplakia.

also that some endophytic carcinomas may still be covered with the original epithelium from which the growth originated so that they will not appear as ulcers at the time of an examination. With the usual type of inspection it may be impossible to differentiate carcinomatous epithelium and the surrounding epithelium, but with the colposcope the diseased area stands out, and should be recognized easily.

Several practical problems of considerable importance may be noted when considering the colposcopic picture of leukoplakias. (1) It is not possible to correlate the colposcopic appearance with the microscopic findings. (2) Definitely malignant leukoplakias may have the same colposcopic appearance as those which are microscopically benign. (3) Biopsy material from a cervix with many areas of leukoplakia may not permit a definite diagnosis since the excised area and the rest of the cervix may have a very different histologic structure. Hinselmann is undoubtedly correct in stating that one may rely on a microscopic negative diagnosis only when serial sections of the entire leukoplakia or the entire cervix have been studied. (4) The gynecologist should attempt to diagnose Hinselmann's matrix areas since their removal by amputation of the cervix or their destruction with the nasal type cautery or surgical diathermy may cure an early carcinoma. (5) Early diagnosis and eradication of diseased areas is the only method available for the prophylaxis of carcinoma of the lower genital tract of women.

Unless one has studied serial sections of a large number of cervices removed by amputation or hysterectomy it is not probable that some of the tissue changes described by Hinselmann will have been observed. He recognizes prematrix change of two types and four grades of matrix change before finding easily recognized cancer. His studies suggest that preleukoplakia and developing leukoplakia may be reversible so that if the underlying cause for the condition is removed the mucous membrane may heal and assume a normal appearance. However, it is apparent that a fully developed leukoplakia or matrix area cannot return to a normal state, hence removal or destruction is necessary. The accompanying photomicrographs illustrate Hinselmann's classification.

The types of treatment which may be used for various cervical lesions are described quite adequately in various works on gynecology, and no attempt need be made to review them in detail here.

Leukoplakia (Matrix) Grade III. Carcinoid epithelium with many pathologic mitoses. Colposcopic diagnosis—leukoplakia.

American gynecologists for some years have emphasized the importance of diagnosing and correcting by appropriate therapy lacerations, ectropion, erosions, polypi, and cysts of the cervix uteri. Personal observations indicate that European gynecologists are inclined to employ a surgical procedure for many conditions which we would treat with the nasal type electric cautery, Cherry's coagulation, or Hyams' conization. At the same time they leave untreated many abnormal cervical conditions which we would correct in the office with one of the previously mentioned procedures.

There may be individual and sectional differences of opinion regarding various corrective forms of treatment but most of us will agree that all cervical lesions should be kept under observation and treated by some method until

satisfactory healing has been secured. Every statistical study, even when we make a considerable allowance for possible errors, indicates that careful prophylactic treatment of cervical lesions is a satisfactory means of preventing the later development of cervical cancer. It is highly probable that each of us who has used the nasal type electric cautery or surgical diathermy for some years has destroyed a few microscopic

Leukoplakia (Matrix) Grade II. Hornified atypical epithelium proliferating into the connective tissue. Colposcopic diagnosis—leukoplakia.

cancers, thereby curing such women from cancer just as effectively as if they had had a radical treatment with surgery or irradiation.

It has been suggested by some that the general use of the colposcope for cervical diagnosis might lead to a considerable amount of unnecessary surgery. Hinselmann has a patient who had an early cancer of the cervix treated by amputation of the cervix who has gone three years without any further evidence of trouble which shows that there is a great difference between the treatment of an early microscopic cancer and one which is well developed. Our use of the cervical type electric cautery or surgical diathermy probably would have been as effective as the amputation. During the past year I have examined with the colposcope a large number of cervices which had been treated with the nasal type cautery or surgical diathermy during the past ten years. The results observed were very satisfactory; the colposcopic appearance of the cervix being normal in most instances. Therefore, it would appear that we are justified in continuing to treat in the office the majority of patients who have minor lacerations, eversions, erosions, and polypi with the nasal type cautery or surgical diathermy. The Hyams' conization has a definite advantage over the cautery and Cherry's bipolar coagulation since the tissue removed is available for microscopic examination. Surgical removal of the cervix and hysterectomy should be reserved for older women and those who have other indications for surgery. Early diagnosis and treatment of cervical lesions is an effective means of preventing cervical cancer. Early diagnosis of developing cancer and adequate treatment by means of irradiation or radical surgery will greatly increase the number of permanent cures.

DISCUSSION

CHAIRMAN ALMY: Dr. Hutchins will open the discussion.

DR. HENRY T. HUTCHINS, Boston, Mass.: *Mr. Chairman, and Members of the Section*—

It is difficult to see how we can do otherwise than agree with Dr. Davis' sane and comprehensive résumé of the many lesions of the cervix uteri. I feel that we concur with him. This paper has forcibly brought to our attention what seems to me to be a fact that is too little recognized.

Cervix uteri is a *distinct organ in itself* apart from its being connected with the uterus. In discussing lesions of the cervix alone, Dr. Davis has focused our attention on this fact, namely, that we must consider the diseases of this organ as entities apart from the uterus itself, just as much as we must consider lesions of the stomach and rectum apart from the whole intestinal tract. Although connected with the fundus uteri, the cervix uteri is a distinct organ physiologically and histologically. It is the inlet and outlet of the uterine canal and functions only as such. It is sharply differentiated from the fundus at the level of the internal os. Its histological picture is entirely different from the fundus as to its glands, muscle and fibrous connective tissue. It, therefore, deserves consideration from the surgeon as a distinct organ of the body and, as it is subject to diseases peculiar to itself, it must be examined and treated with more thought and care than it has been in the past.

We are apt to consider the cervix as an internal organ and, therefore, more or less inaccessible, whereas, the opposite is true. The cervix is an external organ and just as accessible as the tongue or the tonsils. It can be examined under the eye and finger and can be treated easily. Dr. Davis has told us of many procedures which can be carried out as simple office procedures, and if we will only take the trouble to regard this organ as a source of real disease—e.g., cancer for one—we can prevent a great deal of systemic disability, and of course we shall even save a good many lives.

I want to make the strongest possible plea for the examination of the cervix by physicians, and especially by insurance examiners, and the so-called Life Extension Institutes where yearly check-ups are supposed to be made. I have recently seen a case of inoperable pelvic disease where the patient had for fourteen years conscientiously gone for a complete physical examination every year, and yet not once in the fourteen years was a pelvic examination made. The trouble could, and should have been detected in time to have saved her life; and the fault was not the patient's.

What can be done today by way of inspection with the colposcope, treatment by electric cautery, and diagnosis, has been only too clearly demonstrated in the paper to which we have just listened.

We must remember then that the cervix as an organ is a *distinct entity* and subject to its own diseases, which, unfortunately do not always give early symptoms, and therefore, should be observed and treated as a routine part of every physical examination in woman.

These remarks may seem to you somewhat trite, but when one sees, as I have in the past month, a case of inoperable carcinoma of the cervix develop under the care of a physician living, not in the rural districts, but in a city of 100,000 inhabitants,

to whom the patient went for advice for over fourteen months and no pelvic examination was made, one cannot help but feel that failure to make a pelvic examination with inspection of the cervix, comes dangerously close to medical malpractice.

Dr. Davis, in his paper and in his lantern slides, has shown us the points in the diagnosis of early carcinoma of the cervix, and these remarks of mine will serve only to emphasize a statement which he makes in his paper where he says, "It is distressing to find that many of our ablest internists commonly neglect inspection of the cervix when they make a thorough examination of a woman patient. Every gynecologist has seen a considerable number of women who have been under more or less constant supervision of a family physician or a medical specialist during the time that a cancer of the cervix was passing from a curable to a hopeless condition——without any record to show that the cervix had ever been examined——." The use of the colposcope in the hands of the specialist is now, and will undoubtedly prove of value in determining early cervical lesions, but if we can bring about the inspection of the cervix by the eye alone as a more general procedure throughout the profession, many more hopeless cases will be eliminated.

I wish Dr. Davis could present this paper before the Medical Section of this Society as well as before our Section, in order that the necessity of routine examinations of the cervix, and the ease with which cervical examinations can be made, might more clearly be brought to the attention of the internists. It is perhaps a little more bother to make a pelvic inspection than to take a look down a patient's throat, but the actual examination with a bi-valve speculum is just as simple. The colposcope is not necessary for the internist. The untrained eye can detect early abnormalities and then the patient can be referred to the gynecologist for differential diagnosis and early treatment. Just because a patient has no pelvic symptoms, which is frequently the case in early carcinoma of the cervix, is no excuse for the omission of inspection of the cervix during routine physical examinations.

CHAIRMAN ALMY: Dr. George Van S. Smith of Brookline will continue the discussion.

DR. SMITH: *Mr. Chairman, and Ladies and Gentlemen*—

Doctor Davis' comprehensive survey leaves little to consider except by way of confirmation.

At the Free Hospital for Women, tuberculosis of the vaginal portion of the cervix has never been recognized. Of ninety-seven cases of pelvic tuberculosis, high endocervical involvement was found once. Syphilis of the cervix has not been seen.

The recent discovery of a chemical relationship between estrogenic substances and those producing experimental malignant disease suggests that hormonal influence be added to trauma, inflammation and chronic irritation as a possible factor in the etiology of cervical cancer, especially since over 90 per cent of patients with this disease give a history of pregnancy, which brings about tremendous changes in the estrogenic hormones.

The importance of conscientious attention to the cervix during any gynecological operation cannot be overstressed. Five of our own cases were found to have cancer of the cervix five months to four years following supravaginal hysterectomy performed eight to twenty years ago without careful examination and biopsy of the cervix.

We are constantly confronted with the problem of whether to treat diseased but symptomless cervices. Specimens are taken for biopsy on the slightest suspicion, but, unless early cancer is actually present, the only indication for treatment is that it may prevent later trouble. The taking of specimens for biopsy introduces more problems. First, should we be guided in removing tissue by the Schiller test and the colposcope? Despite a fairly extensive use of the iodine test during the past three years and the employment of the colposcope for one year, it so happens that our ten diagnoses of early cancer during this period have been made without these aids. Furthermore, I have been able to find only one instance in which tissue was taken from a non-malignant area when cancer was almost certainly present somewhere else in the cervix. The Schiller test and the colposcope are helpful but not necessary.

The next problem is that of pathological diagnosis. All those experienced in cervical pathology tend to agree that the so-called "precancerous" picture need not cause alarm, for there is no evidence that this is, or necessarily becomes, malignant. The real difficulty is that pathologists do not agree on what constitutes the picture of true early cancer. The criteria of Schiller and Hinselmann are not entirely accepted. I now have sections from twenty-three cervices which I believe show early carcinoma. Of fourteen of them submitted for pathological consultation, only one was considered malignant. A second was thought to contain cancer by two out of five consultants. The patients from whom three other sections were submitted, however, had advanced cancer four to six years after biopsy. Of the other twenty patients, one was treated too late; the rest were treated and are well up to eight years with the exception of one who had endometriosis and reacted severely to irradiation.

Finally, does treatment of diseased cervices prevent later trouble? From the point of view of inflammation and chronic irritation, we know that in general it does. That it may lower the incidence of later cancer is almost impossible to prove. Dr. S. S. Woolston traced 1014 cases of trachelorrhaphy from ten to over thirty years and found that fourteen developed later cancer of the cervix, that five more probably developed it and that four others may have died of it—an incidence at the highest of 2.3 per cent. Four of these patients had had pregnancies after trachelorrhaphy. We have traced 591 cases of cauterization of the cervix five to over twenty years; 37 per cent of them ten to over twenty years. Four hundred and seventy-two had had pregnancies before cauterization. One of these died six years later, cancer of the cervix being stated as the cause. Two others had proved cervical cancer six and six and one-half years after cauterization. The highest incidence we can make for this group is 0.65 per cent. It is impossible to obtain an accurate control figure. Dr. Woolston found statistics indicating that about 2.95 per cent of all women who reach the age of thirty-five in this country die of carcinoma of the cervix. Dr. J. W. Schereschewsky of the United States Public Health Service, who has very generously tried to supply me with a control figure, considers 2.95 per cent too high and calculates an incidence of about 1.6 per cent as being more nearly correct for the country and 2 per cent for Massachusetts. Taking these percentages for what they are worth and allowing for the fact that the percentages for the incidence of cancer after treatment cannot be correct until all cases have been followed until death, it would appear that trachelorrhaphy has little if any prophylactic value and cauterization may have very definite preventive effect. In extenuation there are two considerations to be mentioned. First, the treated cervices undoubtedly had more marked lesions and probably would have been even more prone to malignant change without treatment. Secondly, the figures I have submitted for the treated cases are based entirely on those which had had pregnancies, whereas the control percentages were calculated for both

nulliparous and parous women. The evidence indicates that treatment of diseased cervices is not ill-advised even when they are symptomless.

CHAIRMAN ALMY: The paper is now open for discussion.

DR. BENEDICT F. BOLAND, Boston, Mass.: I would like to add my appreciation of the very thorough and well-written paper which Dr. Davis has delivered this afternoon. His lantern slides have clarified many details that are essential in the conduct of this work. In his paper and slides, he has dealt considerably with the nasal point cautery and has made some mention of the surgical high frequency types of currents. In view of his remarks and experiences in the use of these modalities, I would like to ask the doctor what percentage of good results he has obtained with the nasal tip type of cautery as compared with the high frequency surgical diathermic type of currents, and also whether he has had any experience in the use of these modalities in the treatment of chronic infections, especially of the Neisserian type.

From my own experiences I appreciate that none of these various methods of approach are a panacea in every case. However in an analysis of five hundred cases, which I have performed during the past five years, on the services with which I am associated at the Boston City Hospital, St. Elizabeth's Hospital, and at the Massachusetts General Hospital, and in private practice, I am convinced that excellent or satisfactory results can be obtained in 65 to 75 per cent of these types of cases. As no two cervices are alike, the selection of the case to which these modalities are to be applied and judgment in application are essential if satisfactory results are to be obtained. In the chronic type good results have been achieved in those cases that were free of pelvic tenderness or masses. These measures are contraindicated in the acute infectious or pelvic inflammatory type lest extension of the parametric infection or peritonitis be produced. Gentleness is required as the operator can encounter severe difficulty unless acquainted with the use and application of these methods.

In these local hospitals the Cherry, Remmington and Hyams' methods have been used clinically. Not being one hundred per cent satisfied with these methods, experimental work has been performed on dogs in the Research Laboratory of the Boston City Hospital in collaboration with Dr. Stephen J. Maddock. Our aim has been to determine the amount of tissue destruction that resulted in the utilization of each of these methods. Both clinically and experimentally the Hyams' type has proved to be the best method. The Cherry method, as the doctor has stated, has limited application and has not worked satisfactorily in the multiparous type of cervix. The Remmington method has produced good results in selected cases.

I would like to know, Doctor, what your end-results have been in a comparison of these methods? I thank you.

CHAIRMAN ALMY: Do you wish to answer that now, Doctor?

DR. DAVIS: I cannot answer from the point of view of percentages. I started the nasal type of cautery some fifteen years ago following Dr. Dickinson's first paper, and my largest experience is some place between twelve and fifteen hundred patients treated with the very fine bladed cautery in contrast to the heavy blade of the usual operating room cautery, or the more destructive post cautery. As you could see from the colored plate on the screen, we make our linear incisions some distance apart, and do not get the type of destruction which is obtained with a heavy instrument. My experience with the Cherry cautery has been that it is a poor instrument for the lacerated cervix. I personally am afraid to remove the speculum and let the cervix come down for fear I will do too much damage. As a result, in the few cases where I have used it I have usually destroyed the point by sparking it across and burning an area through the bakelite.

More and more, as I become experienced with it, I am inclined to use the Hyams' conization.

Now, in regard to the chronic gonorrheal infection of the cervix, I believe you can get a good result with either the Cherry or the Hyams' method. I think probably the Hyams is somewhat the safer method in that you do not get the amount of blocking and holding back of secretions following its use that you do when you use either the cautery or the Cherry coagulation.

You will recall that, in the *Journal of the American Medical Association*, a surgeon in Milwaukee reported two patients whom he had seen with very severe complications following the use of surgical diathermy. The statement was not clear, and I have not had the opportunity to investigate those cases. Of course everyone who has written on the use of these treatments has emphasized the fact that you must not use them except in chronic types of infection. They are dangerous with either acute or subacute cases, but are relatively safe in the chronic cases. I believe that they should be used more widely over the country than they have been in the past.

CHAIRMAN ALMY: I am sure we all feel that we are greatly indebted to Dr. Davis for coming here and giving us this splendid paper.

The next paper is by Dr. Charles E. Mongan. His paper is on "Maternal Mortality. A Demand for Fairness."

DR. CHARLES E. MONGAN: *Mr. Chairman and Gentlemen*—

I have taken the liberty of changing the title of this paper without consultation with the Chairman of the Section. The title was "Maternal Mortality. A Demand for Fairness." The title now is "Changes in Maternal Mortality and their Significance."

CHANGES IN MATERNAL MORTALITY AND THEIR SIGNIFICANCE*

BY CHARLES E. MONGAN, M.D.†

I. INTRODUCTION

THE best approach to the problem of maternal mortality seems to be from the side of statistics. Although they lie somewhat afield from medical problems their conclusions, taken over a period of years, form a measure of medical progress. In some instances they can give a direct medical clue, amounting almost to a diagnosis. A close study of the records shows that very creditable work has already been accomplished. An analysis of the structure of the death rate shows which causes of death have yielded to our efforts and which are still a challenge. The distribution of the death rate

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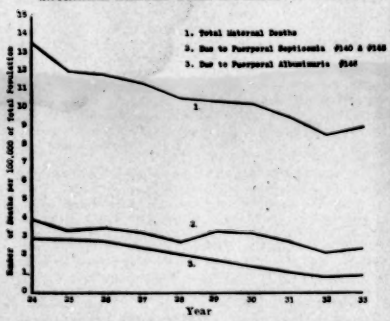
throughout the State indicates that many factors are at work. On the whole the results already obtained entitle us to a reasoned optimism for the future.

The following study has been based on official Massachusetts reports. Some of the data have been compiled and calculated by the Department of the Secretary of State. Other parts have been calculated by the author. The figures

MATERNAL DEATHS OVER A PERIOD OF YEARS



have been collected by the State in accordance with the law and with the international conventions. They are believed to be very reliable, which is a tribute to the conscientiousness of the reporting physician.

OBSERVATIONS

A decrease in the total mortality is readily discernible. It is therefore interesting to see its amount, to study its causes, and to estimate its future. According to the data the rate has declined from 12.5 to 9.0 per 100,000 in 1933. (See table 1.) This is a decline of about twenty-five per cent in the death rate. However, to gain a better insight into the processes at work, it is desirable to analyze the total rate.

Consider that part of the death rate due to septic abortions and puerperal septicemia. (See table 2.) These are causes No. 140 and No. 145 respectively of the International List. A calculation of the figures for 1931, 1932 and 1933 indicates that cause No. 140 (septic abortions) seems practically constant at twenty per cent of the sum of No. 140 and No. 145. Over a ten-year period the death rate due to No. 140 and No. 145 has fluctuated considerably. It is now slightly lower than it was.

Now let us consider the part of the rate due to puerperal albuminuria (see table 3). This rate has shown a constant and persistent decrease until it is now a small contributing factor. Then the tables refer to the changes of the death rate over a period of years. To gain more information regarding the forces at work, it is well to study the structure of the death rate for a given year, say 1933. (See table 4.)

We can arrange the causes of death in the order of the number of deaths they have caused:

TABLE 1

TOTAL MATERNAL DEATHS IN MASSACHUSETTS OVER A PERIOD OF YEARS

Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Number	498	544	501	501	486	456	453	438	408	369	389
Rate	12.5	13.6	12.1	11.9	11.4	10.5	10.4	10.3	9.5	8.6	9.0

Number refers to the sum of all deaths from causes No. 140 to No. 150 of the International List, calculated on the basis of 100,000 of the population.

TABLE 2

DEATHS FROM PUERPERAL SEPTICEMIA

Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
Number	128	161	140	150	141	123	147	141	119	96	103
Rate	3.2	4.0	3.4	3.6	3.3	2.8	3.4	3.3	2.8	2.2	2.4

Deaths due to the sum of causes No. 140 and No. 145 of the International List, calculated per 100,000 of the population. Cause No. 140 is septic abortion. Cause No. 145 is puerperal septicemia. Deaths due to cause No. 140 run twenty per cent of those due to the sum of No. 140 and No. 145.

TABLE 3

DEATHS FROM PUERPERAL ALBUMINURIA, BEING CAUSE NO. 146 OF THE INTERNATIONAL LIST

Year	1923	1926	1931	1932	1933	1934	1935 (¼)
Number	130	120	52	35	41	29	5
Rate	3.0	2.8	1.2	.80	.95	.67	.46

The rate is calculated for 100,000 of the total population.

TABLE 4

DISTRIBUTION OF MATERNAL DEATHS AMONG THE VARIOUS CAUSES FOR 1933

Int. List Number	Total Deaths	Rate per 100,000	Per Cent	Cause
140	19	0.43	4.9	Septic Abortions
141	16	0.37	4.1	Abortions Without Mention of Condition
142	20	0.46	5.1	Ectopic Gestation
143	1	0.02	0.26	Accidents of Childbirth
144	56	1.30	14.3	Puerperal Hemorrhages
145	84	1.94	21.6	Puerperal Septicemia
146	41	0.95	10.5	Puerperal Albuminuria
147	26	0.60	6.7	Other Toxemias of Pregnancy
148	55	1.27	14.1*	Puerperal Phlegmasia, etc. (53 were Embolism and Thrombosis)
149	67	1.55	17.2	Other Accidents (20 were Cesareans)
150	4	0.09	1.0	Unclassified
	389	9.00	100%	

*Cause No. 148 of the international list includes: Puerperal Phlegmasia Alba Dolens, Embolus, Thrombosis, Sudden Death not specified as septic.

TABLE 5

DISTRIBUTION OF MATERNAL DEATHS THROUGHOUT THE STATE

City	Population	P. Sept.	Others	Rate P. S.	Others
Attleboro	21,769	0	1	0	4.6
Cambridge	113,643	4	16	3.4	14.0
Dedham	15,136	0	0	0	0
Everett	48,424	0	4	0	8.2
Fitchburg	40,692	0	3	0	7.4
Framingham	22,210	0	1	0	4.5
Gloucester	24,204	1	2	4.1	8.2
Lynn	102,320	4	7	4	7
Malden	58,036	2	8	3.4	14.0
Medford	59,714	1	3	1.7	5
Newburyport	15,084	0	0	0	0
North Adams	21,621	0	3	0	1.4
North Attleboro	10,197	0	0	0	0
Northampton	24,381	0	4	0	16
Salem	43,353	3	2	6.9	4.6
Somerville	103,908	2	5	1.9	4.8
Waltham	39,247	1	0	2.6	0
Woburn	19,434	0	0	0	0

(1) Puerperal Septicemia, No. 145 with twenty-two per cent; (2) Other accidents, No. 149 with seventeen per cent; (3) Puerperal Hemorrhages No. 144 with fourteen per cent; (4) Puerperal Phlegmasia, No. 148 with fourteen per cent; and (5) Puerperal Albuminuria, with eleven per cent. One third of all deaths in class No. 149, or nearly five per cent of all maternal deaths, were associated with cesarean operations. On the other hand practically all deaths charged to No. 148 are due to embolism.

In table 5, the distribution of deaths throughout the State is shown. Some cities have an exceptionally favorable rate. Others are highly unfavorable.

Now let us consider the significance of these figures and observations.

DISCUSSION

The decrease in the total death rate is due almost entirely to the decrease in the rate for puerperal albuminuria. This is a reflection of the work of the Massachusetts Medical Society, in pre-natal care. The results are so favorable that it must be strongly urged to continue the good work. In general the puerperal albuminuria situation is better than formerly, for this year's rate is about twenty per 100,000 of the total population.

The same cannot be said of puerperal septicemia which has had its ups and downs. This is a difficult problem. However, the advice of this Section of the Massachusetts Medical Society to practice antisepsis diligently, is well grounded by the figures. A careful physical examination is also helpful.

Due to the decrease in puerperal albuminuria and puerperal septicemia, other causes of death are becoming relatively more important. These are as follows: (1) embolism, No. 148; (2) hemorrhages, No. 144; (3) accidents, No. 149. If the deaths ascribed to embolism were correctly diagnosed, then we face another difficult situation. For we cannot at the moment do much to prevent embolism.

The number of deaths from the International List, cause No. 144 (puerperal hemorrhages), is great enough to warrant an attack by the best skill and judgment of all practicing in this field.

The item No. 149, accidents, is somewhat vague. It is, however, remarkable that one-third of all accidents, which is five per cent of all maternal deaths, can be attributed to those conditions where cesarean section was employed as a surgical measure. This indicates the gravity of the decision to use the cesarean operation.

Now a few words regarding the distribution over the State are in order. Some cities have a very favorable death rate. Others are very differently situated. As the standard of medical skill varies but little from place to place in Massachusetts, we are forced to seek other causes to explain this erratic distribution. It appears from a consideration of the characteristics of the various regions that social and economic factors are playing the dominant part.

In conclusion we may remark that the general trend of the death rate is favorable. These results justify the efforts which this Section has already made. They provide the basis for a genuine optimism. On the other hand the analysis of the causes indicates the points where fur-

ther efforts would bring great results. It therefore behooves the Section to continue its vigorous efforts, for the prize is great.

DISCUSSION

CHAIRMAN ALMY: The discussion will be opened by Dr. Kellogg.

DR. FOSTER S. KELLOGG, Boston, Mass.: Dr. Mongan's paper marks a summary of the educational work of this Section to date. The results he reports are a tribute to the efforts of the Section, to the men who have worked hardest for it, and to him, in particular, because I think he conceived the idea. The figures that he presents appear to show the value of persistent work throughout the year. This has been the underlying idea of the Section from the beginning. And since it was his idea primarily and he has always given unselfishly and completely of his time and himself to it, I think his position as an educator in obstetrics in this State is equal to that of any of our men of professorial rank in the schools.

I will discuss one or two points in the paper very briefly. In the first place, the one apparently outstanding improvement that has been made is in the group of hypertension-albuminuria cases. This is due, as Dr. Mongan has said, to greater attention to prenatal care, but also to the advice which the Section has carried through the State, that patients with pre-eclampsia and albuminuria and hypertension should be hospitalized early and if they fail to improve on medical treatment in hospital, delivered by the gentlest possible means.

In the last fifteen or twenty years at the Boston Lying-In Hospital, since accouchement forcé was abandoned, we have saved no patients by altering our treatment of eclampsia but have saved a good many by earlier treatment and delivery in pre-eclampsia. So this seems, in the light of the present lack of knowledge, a good system to pursue.

In the second place, it is discouraging to note our failure to improve results in the bleeding cases in the State. Those of us who have done the educational part of the program are perhaps somewhat to blame for this. We have gone about preaching that every patient who bleeds antepartum must be considered a placenta praevia unless proved otherwise. Some of us also have agitated quite strongly the delivery of most placenta praevias by Caesarean section. It is possible that some patients who have had antepartum bleeding have been subjected to Caesarean section without the diagnosis of placenta praevia having been established.

This brings us directly to my third consideration. Dr. Mongan reports a high mortality in Caesarean section cases throughout the State. It seems probable that, as for many years in the past, too many Caesarean sections are done and they are not done under careful enough indications. Though individuals seem capable of doing long series of abdominal deliveries with no mortality at all, these happy results seem never to get into state-wide statistics, and the moral that we must all draw from this is, that in each individual instance, we should think twice before we subject a patient to Caesarean section.

Last, the mortality from sepsis. This rate will diminish if we adhere to the rule that, whenever possible, a patient shall be allowed to deliver herself normally, without instrumentation, and that especially we will never operate through the undilated, partially dilated, or so-called dilatable cervix. In hospital we will avoid the periodic exogenous throat infection epidemics if we insist on all contacts with the patient's perineum being masked throughout labor and throughout puerperium.

I thank you for your kind attention.

CHAIRMAN ALMY: Dr. DeNormandie will continue the discussion.

DR. ROBERT L. DENORMANDIE: When Dr. Mongan handed me his paper to read he said he hoped that if I differed from him I would frankly say so, for by that means he hoped discussion would be stimulated. I am going to take him literally and differ from him, thereby hoping that others will carry on.

At the present time most statistical studies on maternal mortality are based on rates determined in relation to 1,000 live births. Dr. Mongan has, however, used rates calculated upon the basis of 100,000 of the population. The rates as he has given them are not, therefore, comparable to many reports that have already been published. To be sure, such rates are published from time to time, but usually only when the more accurate method, that in relation to the number of live births, is not available. In Massachusetts this latter method is available, and I regret that Dr. Mongan did not use it. The Fifteen States Study, the New York and the Philadelphia Studies are all based on the rates per 1,000 births.

In table 2 Dr. Mongan has given us the results of adding together rubrics 140—Septic Abortion, and 145—Puerperal Septicemia, of the International Classification. This seems wholly justifiable, but in table 3 he shows the rate for puerperal albuminuria to be 3 per cent in 1923, dropping to .67 per cent in 1934, that is, 130 cases in 1923 and twenty-nine in 1934. The reason for this decided improvement he does not state, but it was due chiefly to the changes in the 1929 revision of the Manual of the International List of Causes of Death. In this revision, rubric 146 became "Puerperal Albuminuria and Eclampsia," and 147 became "Other Toxemias of Pregnancy." To show the correct picture, these two rubrics should be added and the percentages calculated from these figures. On this basis the maternal death rate in eclampsia and toxemia becomes in

1931	22.7			
1932	18.9			
1933	17.2			
1934	18.6			
146 Puerperal albuminuria and eclampsia	52	35	41	29
147 Other toxemias of pregnancy	41	35	26	30
	93	70	67	59

The last three years are better than 1931, but 18 per cent of the total deaths cannot be considered "a small contributing factor" of maternal mortality. The situation undoubtedly has improved, but there is still great room for effort and improvement.

Dr. Mongan states that rubric 149—Other Accidents of Childbirth—is somewhat vague. But is it? It is divided into two parts:

(a) Caesarean operation Porro's operation
(b) Others under this title

Caesarean section is not vague. The second subdivision takes in the various obstetric operations—breech, rupture or inversion of the uterus, rupture of the bladder, malpresentation. It seems perfectly clear what the intent of this division is—death from difficult delivery.

I do not believe the whole story of Caesareans is explained by saying that 5 per cent of all the maternal deaths can be attributed to Caesarean section. I am confident that there were more. If each death were studied, Caesareans would be found under at least three other rubrics—namely, 144—Hemorrhage, 145—Sepsis, and 146—Puerperal Eclampsia. I do

not believe "Caesarean operation" *per se* should ever be accepted as a cause of death. Caesarean section does not kill. It is the condition for which it is done, hemorrhage or eclampsia, or the complication of sepsis which follows, which kills, and therefore the death should be put in the proper rubric and not under Caesarean operation.

I take it that most of the deaths in this section were due to poor operative obstetrics, either in the choice of operation or lack of skill in performing it. It would have been most interesting if Dr. Mongan could have told us how many times operative procedures preceded death in this group.

Dr. Mongan, I think, questions the correct diagnosis of so many cases of embolism. I too question the diagnosis. Some undoubtedly were rightly ascribed to embolism, but embolism sounds much better than rupture of the uterus following a hard forceps or version. The diagnosis of embolism is accepted by the registrar usually without question.

I agree that there has been a slight improvement in the general trend of the death rate, but I cannot subscribe to the statement that it provides a basis for genuine optimism. The effort of this Section must be to reduce the number of these deaths. It is not alone a medical problem. The social and economic condition of the patients plays a part. The Section can do no greater good than to popularize throughout the State the meaning of good, adequate, conservative maternity care. Then each one of us must live up to this standard.

In order to accomplish this purpose I believe that in each of the District Societies a committee on maternal welfare should be appointed. It would be incumbent upon these committees to hold meetings for the purpose of showing what adequate maternity care is. These committees should follow up carefully each maternal death in their district. The deaths should be studied on the same schedules so that they would be comparable, and each year a short report should be made in regard to progress. The formation of such committees would be in line with what the American Committee on Maternal Welfare is doing throughout the country, and what it wishes. By this means the entire State would be covered, no undue amount of work would be put onto any one committee, and the whole could be carefully compiled each year into a most valuable report. By this means the Section could be a real power in the State for demanding good, sane obstetrics.

CHAIRMAN ALMY: The paper is now open for discussion from the Section.

DR. SAMUEL GWYNNE, Worcester, Mass.: I would like to ask Dr. Mongan if he has any figures as to whether those Caesareans were done by general surgeons or whether they were done by obstetricians.

CHAIRMAN ALMY: Dr. Mongan, do you care to close the discussion?

DR. MONGAN: In answer to Dr. Gwynne, there is no way of knowing when a surgeon is an obstetrician and when an obstetrician is a surgeon. Dr DeNormandie says it is a live issue. He and I apparently agree. I think this chart was presented by the State Department of Public Health, Dr. DeNormandie?

DR. DENORMANDIE: Yes.

DR. MONGAN: And the State Board of Health is not the official source from which maternal death rates or any death rate is collected in Massachusetts. Keep that in mind. That is the first thing.

I do not criticize Caesarean operations. I said that a certain number of deaths occurred where the obstetrical procedure of a Caesarean operation was employed. Dr. DeNormandie says that if we look farther we might find more deaths in which the surgical operation of Caesarean section was employed. Yes. I didn't report them all. Some are under "hemorrhages" which happened after the Caesarean operation was performed. Since 1929 Caesarean operations have a separate classification. I think that is a misleading classification. I would rather have the reasons why the obstetrician felt it necessary to perform Caesarean operations.

The classification of "the toxemias of pregnancy" has been changed. Let me tell you the history. The international classification of diseases was the outcome of an agitation brought about by Bertillon, the French scientist who invented finger printing. It was he who called together representatives of all the civilized countries of the world to determine and agree upon a system of classifying deaths. This list has been revised every ten years. The last revision was in 1929 partly through the agitation of this Section which sent a message through the American Medical Association to the Chief of the Census Bureau in Washington when this Section met in Swampscott in 1924, requesting this change in classification. Were all the toxemias of pregnancy under the old classification put under albuminuric pregnancy? No, they were not. They are not today. There are now two classifications. One—146—"Puerperal Albuminuria and Eclampsia" and 147 "Other Toxemias of Pregnancy."

We do think that there has been a decided change in the albuminuria of pregnancy. We also think that the reporting of the other toxemias of pregnancy should be more specific. I should hope that no one listening to my paper could think for a moment that we were going to give up our work of striving to eliminate albuminuric pregnancy. If I created that impression it is one that I did not wish to express. Every month there is submitted to me from the Department of the Secretary of the State a list of all the diagnoses of deaths occurring in the puerperal state in Massachusetts. I suppose in the last fifteen or eighteen years I have studied and reviewed over 5,000 death certificates, some of them written by men here. On the whole these certificates are a credit to your professional ability. There are very few of these certificates that in any way indicate that the reporting physician was trying to camouflage or evade any condition which it was his duty to report. There are some, however, which are open to question.

When you write a death certificate in a puerperal case, be specific, be short. Know what you are going to say, and say it honestly. If the patient did die of puerperal septicemia, say so. There isn't any man practicing obstetrics over a period of years but must have had that sad duty to perform. If it was eclampsia, say so. No matter what the actual condition was, say it succinctly and precisely. Then these lists of causes of deaths will amount to something.

Remember toxemias were not classed in the old days under albuminuria. Puerperal septicemia; the British call it a riddle, and I call it a riddle, too. It sometimes varies with the seasons. When there is a large amount of puerperal septicemia prevalent it occurs here and all over the world. It seems sometimes as if we had reached a point where we can make no impression on it. We are not the only country that has septicemia to deal with, nor are we the only country that is studying the problem. In studying the subject let us use statistics gathered by Massachusetts physicians and not those statistics collected in a manner we do not know about. I thank you.

CHAIRMAN ALMY: The paper on "Presacral Neurectomy" will be read by Dr. Frank A. Pemberton, Professor of Gynecology at Harvard College.

RESECTION OF THE PRESACRAL NERVE IN GYNAECOLOGY*

BY FRANK A. PEMBERTON, M.D.†

THE presacral nerve, or superior hypogastric plexus, is a network of nerve fibres, or rarely a single nerve, extending downward from just above the bifurcation of the aorta for a distance of about five cm. It lies in the areolar tissue between the peritoneum in front and the aorta, left common iliac vein, and sacrum behind. It is part of the autonomic nervous system and is composed mostly of fibres from the sympathetic division of that system.

The fibres come from the inferior mesenteric plexus and adjacent lumbar ganglia of the sympathetic system which, as they enter the pelvis, spread out forming a triangle at the lower corners of which are the inferior hypogastric plexuses. From these, fibres run down to the pelvic ganglia on each side of the pelvis of which they are the sympathetic roots. They are joined here by fibres from the sacral part of the spinal cord which constitute the parasympathetic roots of the pelvic ganglia. From these ganglia, nerves run to the various pelvic organs. This description was obtained from Livingston[1] and Davis[2].

The presacral nerve itself is not often a single nerve. Davis reports that in eighty-five per cent of his cases it was a plexus of fibres and in fifteen per cent one nerve. All of our cases have shown a poorly defined bundle of many small fibres with one or more easily seen nerves among them in a few cases. We have demonstrated nerve fibers in the tissue removed from all our cases by means of the microscope.

According to Livingston who sums up the opinion of many authorities, the autonomic nervous system sends out impulses to the visceral organs. It is thought from its anatomical arrangement and experimental data that the sympathetic division is used for a wide diffusion of impulses while the parasympathetic division carries impulses to single organs to produce specific and local effects. Further there is a theory that these two divisions work antagonistically to each other and maintain a balance when they function normally. There is experimental evidence both for and against it, so the problem is not solved but it makes a good working plan for clinical application at present. It is believed that the sympathetic division maintains tonicity of the blood vessels because it causes constriction of them when it is stimulated while the parasympathetic has the opposite effect. The sympathetic nerves produce their effects by elaborating a substance called sympathin at the nerve endings, a substance which seems to be identical with adrenalin. The other division similarly elaborates a substance called acetyl-choline.

The autonomic nervous system does not complete all its reflexes through the spinal cord, for centers in the brain which control it have been found but their limits have not been defined.

Finally there is an afferent system of visceral nerves which carries impulses from the viscera to the central nervous system. These impulses are largely subconscious but when the integrity of an organ is threatened by disease these impulses reach consciousness as pain of varying intensity.

We are concerned primarily with the presacral nerve and its function. It is said by both Livingston and Davis that its sympathetic fibres cause relaxation of the intestinal musculature and an increase in the tone of the sphincter muscle because cutting it in chronic dilatation of the colon, Hirschsprung's disease, is followed by contraction of the intestine. The theory is that the operation gives the parasympathetic nervous system a better chance to excite contractions of the muscle. It is supposed that there may be a similar control of the uterine and bladder musculature.

The presacral nerve probably controls the tone of the blood vessels in the genital organs. It is not uncommon after presacral neurectomy for the patient to flow from the uterus for a few days even though menstruation has ended just before operation. Cutting the sympathetic supply may allow the parasympathetic to cause dilatation of the vessels which could account for the bleeding. Many cases of essential dysmenorrhea have sclerocystic disease of the ovaries which theoretically may be due to some effect on the blood supply from an imbalance in the autonomic nervous system.

The presacral nerve, according to Livingston, probably contains fibres of the afferent visceral nervous system as well as its sympathetic part, because cutting it relieves pain in dysmenorrhea, diseases of the bladder and cancer of the pelvic organs. It usually relieves the pain immediately but since it does not do so always Davis suggests that the effect may be obtained by stopping an imbalance in the vasomotor apparatus. This is a subject of discussion with no satisfactory explanation. If the autonomic nerve control of the uterus is analogous to that of the large intestine one would suppose that removing the sympathetic division would allow the parasympathetic to excite stronger contractions of the uterine muscle and increase dysmenorrhea rather than relieve it. Either dysmenorrhea is not due to muscle contractions, the pain is caused by blood vessel spasm from the

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action of the sympathetic system or the pain has nothing to do with the autonomic nervous system and relief is obtained by cutting the afferent visceral nerve fibres in the presacral nerve which carry pain sensations.

Clinical reports offer no good explanation of why presacral resection should be as effective as it is. It is used as a gynecological procedure to relieve pain in dysmenorrhea, malignant diseases in the pelvis, and idiopathic pain. Some writers mention beneficial effects in pruritus vulvae.

In essential dysmenorrhea it should be used, as a rule, only after all other methods of treatment have failed. One should remember that hygiene, regulation of habits of body and mind, and medicine should be given a thorough try first. If these fail then operation may be considered. Whether to do a dilatation of the cervix alone and reserve presacral neurectomy for cases in which dilatation fails or to do both right off is a matter of individual selection depending on the severity of the symptoms and the patient's mental attitude. We believe that if the patient has reached full growth, that is the age of twenty-one, it is useless to temporize and both procedures had better be carried out. Further we believe that if the uterus is retroverted or anteflexed and retrocessed that a suspension of the uterus aids in relief so we do that also and as a result have only one case to report who has had simply a dilatation of the cervix and presacral neurectomy.

In dysmenorrhea due to pathological conditions in the pelvis, this operation is combined with the removal of diseased organs or correction of versions to make success more certain.

We have debated the use of this procedure in conservative operations for diffuse endometriosis for fear that we might implant the disease retroperitoneally but are inclined to the opinion that if the neurectomy is done as a first step in the operation as a whole the danger is slight enough to be disregarded.

We have discarded it for the time being in patients suffering from pain due to advanced cancer of the cervix because the injection of alcohol into the spinal canal has been so satisfactory. Resecting the nerve means an abdominal operation with its attendant hospital stay and period of convalescence for a patient who is in poor condition with not very long to live anyway.

There seem to be no permanent deleterious effects caused by the operation. There are reports that postoperative catheterization is necessary more often and that a residual urine occurs but it is for two or three days only. It has no effect on childbirth. Fontaine and Herrmann[3], Wetherell[4], De Courcy[5] and others report normal pregnancies and labors following the operation. Wetherell[4] reports the relief of obstinate constipation in one case as well as the beneficial effect on her dysmenorrhea.

Section of the nerve does not alter the normal menstrual cycle except for the bleeding which follows the operation in some cases. Menstruation which has been scanty or profuse usually returns to normal.

De Courcy[5] reports twenty-one operations done for dysmenorrhea with excellent results. Greenhill[6] has done it in both essential and other dysmenorrheas and recommends it. Counseller and Craig[7] have had a similar experience in fourteen cases. There are many satisfactory reports from Europe where the operation was first performed in France thirty years ago but discarded until about ten years ago.

There are very few reports of its use to relieve pain in advanced cancer of the cervix. Behney[8] cites twenty-two cases. Sixteen were relieved of the pain but seven lived less than four weeks after the operation.

The technique of the operation is not so simple as the various reports say, in our opinion. The peritoneum over the bifurcation of the aorta is opened by a longitudinal incision which is enlarged to about ten cm. in order to obtain sufficient exposure over the lower end of the aorta and well down on the sacrum. One sees areolar tissue with nothing distinctive about it until a close inspection shows small nerve fibres running through it and sometimes a well-defined nerve or two. We lift the peritoneum and clear its under surface carefully out to the ureter on the right and the inferior mesenteric artery on the left, which may have to be pushed aside in some cases in order to reach all the fibres. Then a triangular space from just above the bifurcation of the aorta downward for about five cm. is cleared of all areolar tissue and nerve fibres. At the apex we have often cut small vessels which needed ligation and similar ones at the lower corners of the triangle. The middle sacral artery can be avoided usually but we feel sure that it has been cut twice in our series without damage. One must be careful to avoid injuring the right ureter, inferior mesenteric artery, and left common iliac vein which lies on the left in the posterior wall of the triangle. The incision in the peritoneum is closed with fine catgut.

We have a series of forty-one cases who have had a presacral neurectomy, twenty-five done by various members of the staff of the Free Hospital for Women and sixteen by the author in his private practice.

Fifteen patients had no other pathology than some form of undevelopment of the pelvic organs and had never been pregnant. That is they had essential dysmenorrhea. Their ages varied from sixteen to thirty-seven with an average of twenty-six. They were all twenty-five or over except one girl of sixteen who was operated on

primarily for appendicitis, and presacral neurectomy was done because she had severe dysmenorrhea. We think it is evident from these age statistics that we have been very conservative in the application of this new operation. They are patients who had had medical methods tried first in most cases without relief. The operation in fourteen consisted of a dilatation of the cervix, a suspension of the uterus by Olshausen's method, and an incidental appendectomy as well as the neurectomy. We do a suspension of the uterus because experience has shown that it helps in the cure of dysmenorrhea, and feel that everything should be done. Therefore we have only one case which had a dilatation and presacral neurectomy alone done for essential dysmenorrhea.

The time since operation varies from two to thirty-six months with an average of fifteen.

Twelve (80 per cent) of these fifteen patients were relieved, one (7 per cent) had partial relief, and two (13 per cent) had no relief. The one with partial relief has pain with every third period on the average so she is much better. We cannot explain why this should be. The two with no relief are recent cases each having had only two periods since operation which were just as painful as before. There is nothing distinctive to show why they were not relieved and it seems as if the whole nerve should not have been removed.

Dilatation of the cervix alone gives relief in about fifty per cent of cases while dilatation and suspension relieves about sixty-five per cent, so the addition of the neurectomy is of distinct benefit. Therefore it may be sensible to change our rule of waiting until the patient has reached her full growth and do it on those who have had thorough medical treatment followed by a simple dilatation of the cervix without relief.

Presacral neurectomy may be used as an adjunct in treating dysmenorrhea due to pathological changes in the pelvis. We have so used it on eighteen patients who had conservative operations of various kinds. The main diseases were as follows: pelvic inflammation in seven, prolapse in seven, fibromyoma of the uterus in two, and endometriosis in two. They had various types of conservative operations all of which included a suspension of the uterus and a presacral neurectomy. We have lost track of one. Eleven were relieved of the dysmenorrhea, four had partial relief and two no relief. One is pregnant and one has had a normal labor since operation. Some of them have minor pelvic pain of an aching character which is not bad. It is our impression from studying these cases that cramp-like pain is relieved by the neurectomy because of the common statement by the patient that her cramps are gone but she has some aching at times, apparently depending on how bad the original pathological condition was and the condition in which the pelvis was left. The type of operation done on these patients differed so much that no exact conclusions can be drawn. Neurectomy adds little to the risk and should be done in an attempt to use every effort to obtain relief.

Two patients had hysterectomies and bilateral salpingo-oöphorectomies for pelvic adhesions due to a previous inflammation as well as a neurectomy and are entirely relieved. How much the neurectomy had to do with the cure is uncertain but it may be of value as shown by the next case.

This woman of thirty-four had a conservative operation for pelvic inflammation in 1929. She came to the author in 1931 complaining chiefly of a dull ache with sharp pain at times in the left lower quadrant. He found the pelvis full of adhesions, and the uterus, tubes and ovaries so damaged that it was necessary to remove them. She made a normal convalescence but continued to have the same pain. The urinary and gastrointestinal tracts were negative to x-ray examination. Medical and orthopedic consultations were negative. In 1933 the patient demanded that something be done and following a presacral neurectomy she has been well.

A spinster of sixty-eight had had a hysterectomy and bilateral salpingo-oöphorectomy seventeen years before. She complained of sharp pain in the lower abdomen of three months' duration and frequent burning micturition of ten days' duration. On November 9, 1932, a pyelogram was done with negative findings. A gastrointestinal x-ray was negative. She was treated by means of bladder dilatation and irrigation without improvement. On March 31, 1933, operation by the author revealed a loop of sigmoid adherent to the bladder over an area of about four square inches. This was separated and the presacral nerve removed. The interesting point in this case is that the patient said three days after operation that the sharp pain had gone and all she noticed was some irritation which seemed to be in the urethra. This irritation subsided and she felt well in a month. There is no proof that the neurectomy helped in the cure but it seems very possible.

Therefore in cases similar to the last four we are inclined toward doing a presacral neurectomy with the hope that it may aid in the cure although it will be a difficult proposition to prove.

We have used the operation in four cases of cancer of the cervix to relieve pain without success. They had widespread growths in the broad ligaments and retroperitoneal areas. In this disease the operation is done on patients who have not much longer to live anyway. More important however is the fact that the injection of alcohol into the spinal canal to destroy the sensory roots has been successful at the

Free Hospital for Women. It is simple to do, effective, and so far has not been followed by complications. This will be made the subject of a report by Younge at a later date.

SUMMARY

Presacral neurectomy relieves dysmenorrhea of the essential type and may help in that due to pathological conditions.

It is apparently of value in stopping idiopathic pelvic pain and pain due to malignant growths.

It has no deleterious effect on pregnancy and labor and may restore irregularities of menstruation to normal. The mechanism of its action is not definitely known.

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DISCUSSION

CHAIRMAN ALMY: Dr. James C. White will open the discussion.

DR. JAMES C. WHITE: Dr. Pemberton has given you an excellent exposition on the value of resection of the superior hypogastric plexus in gynecology. His is the largest series on record in this country, and it seems almost presumptuous to add our small number of seven cases from the Massachusetts General Hospital. These have been operated on by Dr. J. V. Meigs and me. The only thing that is significant about our series among the large number of favorable case reports which have appeared in the literature is that in six of our cases we have carried out no other procedure besides presacral neurectomy and routine appendectomy. For purposes of control, retroverted uteri were left retroverted, and the pain was wholly relieved in all but one instance (and she is none the less definitely better). These cases have been followed from six months to four and one-half years. Now that the effectiveness of cutting the viscerosensory nerves from the uterus has been so well established, we agree that routine suspensions and any necessary procedure on the tubes or ovaries should be carried out at the same time. In corroboration of Dr. Pemberton's statistics, none of these patients have complained of any postoperative difficulty with urination or any other disturbance. In this connection the recent anatomical observation of Stopford and Telford should be emphasized—that the pelvic parasympathetic supply, which stimulates the lower colon to normal defecation, travels upwards in the hypogastric nerves. If the presacral nerve dissection is carried too far down into the pelvis, these fibres may be cut as they branch off to join the superior hemorrhoidal artery. On the other hand, the operator who fails to dissect downwards far enough will fail to destroy the ramus from the fourth lumbar ganglion, which runs under the common iliac vessels. I believe that this is a cause of occasional failure, and that the surgeon should not be satisfied until he has thoroughly dissected the triangle below the aortic bifurcation down to the origin of the internal iliac vessels.

I believe that the relief of pain which follows this operation is directly due to the cutting of visceral pain pathways. From a strictly anatomical viewpoint the presacral nerve, like the splanchnics and the cardiac nerves, contains a majority of small unmyelinated sympathetic motor fibres. It also carries a certain number of large myelinated neurones, which Heinbecker has shown are identical histologically, and in their electrical conduction properties with ordinary sensory nerves to the skin like the saphenous. Furthermore, these fibres come from the posterior spinal sensory roots, and are therefore identical with ordinary sensory nerves to other parts of the body.

CHAIRMAN ALMY: Dr. Louis E. Phaneuf will continue the discussion.

DR. LOUIS E. PHANEUF, Boston, Mass.: *Mr. Chairman, and Members of the Section—*

Dr. Pemberton has brought to our attention an important method in the treatment of intractable primary spasmodic dysmenorrhea.

Three groups of nerves are concerned in the innervation of the female genital apparatus,—(1) the pelvic sympathetic: superior hypogastric plexus of Hovelacque, presacral nerve of Latarget; (2) the utero-ovarian nerves and (3) the pudendal nerve from which the perineal nerve arises. The first two innervate the internal genital apparatus and the vagina, while the third supplies the external genital organs and the perineum.

Resection of the presacral nerve for dysmenorrhea was popularized by Gaston Cotte of Lyon, France, in 1924. Cotte has written an excellent book entitled Chirurgie du sympathique pelvien, Masson & Cie, Paris, 1932. In this book the indications and technic are well described. Since 1924 several papers and case reports have appeared in the literature. Among the American contributions may be mentioned those of Adson and Masson, Elsut, Fontaine and Herrmann, Greenhill, and Wetherell.

A symposium on "pain in gynecology" was presented before the second Congress of the French Gynecological Society in 1933. Cotte presented one of the reports at this Congress. In his paper he reported more than thirty pregnancies following presacral neurectomy in his series. In all of these cases the deliveries were normal and without complications. He stated that he had not encountered any trophic disturbances or atrophy of the vulva and vagina following this intervention.

From the standpoint of technic he advises against trying to isolate the sympathetic fibers, but advocates the removal of about 3 cm. of the cellulofibrous membrane which is found under the peritoneum and which contains the fibers. The tissue removed should be examined histologically to demonstrate these nerve structures.

At the same Congress, L. Aubert of Geneva, in discussing Cotte's report, gave the details of his sixty presacral resections. In this group he reported but two failures. Pregnancy had ensued in a few of his patients who had had normal labors.

I am in complete agreement with Dr. Pemberton that this operation, valuable as it may be, should be used cautiously since dysmenorrhea, in many instances, may be relieved by medical, endocrine and other surgical means. It should be reserved for

those patients who have not been helped by the ordinary methods of treatment. Since, in the past, some of these women have been treated by hysterectomy, radiation and opiates, it seems logical that in the future these procedures should be supplanted by a resection of the superior hypogastric plexus, bearing in mind, however, that the intervention carries the risk of a laparotomy.

Personally I have done but three presacral resections. The operation is not difficult if one has the anatomy of the parts clearly in mind. For my part, I examined the superior hypogastric plexus in several anatomical subjects to familiarize myself with the landmarks before performing my first operation. All three of my patients were relieved of pain in their subsequent menstruations. The first patient so operated realized that she was menstruating when blood appeared on her clothing, the period being absolutely painless, although before the intervention she was so crippled from dysmenorrhea that she had to remain in bed and resort to opiates. I have had no experience with presacral neurectomy for carcinoma of the cervix or for pruritus vulvae, although there are reports in the literature to the effect that relief may be obtained in these two lesions by resecting the presacral nerve.

Dr. Pemberton has shown us a useful procedure, which, when employed in properly selected cases, is attended with uniformly good results.

CHAIRMAN ALMY: The paper is open for general discussion.

DR. JOHN FALLON, Worcester: After you have heard the story of so rich an experience as this, I would not dare to get up and talk about my own, which is limited to seven cases, if I disagreed with Dr. Pemberton. But I don't. I agree with everything he has said, and would only add two minor ideas.

First: The operation promises well, is still, at least on this side of the water, a shade experimental. Not difficult, it requires a little special knowledge and technique (helped, by the way, by Cushing clips). Therefore it is not something to recommend for every dysmenorrheic maiden who happens to see us. Dr. Pemberton said as much. I would add the corollary. When the abdomen of a dysmenorrheic is already open, for whatever reason, it seems not only justifiable but desirable to add this step to whatever is being done, if it is technically feasible.

Secondly: The patient with enough recurrent pelvic carcinoma to give intractable pain and, unfortunately, enough strength to last some time, seems to be the ideal subject for study. Three of my cases were in this group, and the three did well—probably from luck, possibly because a wider sympathectomy was done. The resection included the presacral plexus, lower two lumbar ganglia on each side, inferior mesenteric and iliac nerves. Surgically more radical, this seems less radical physiologically than intra-arachnoid alcohol.

CHAIRMAN ALMY: Unless there is some more business to come before this Section, the meeting stands adjourned.

OBSERVATIONS ON THE SYMPTOMATOLOGY OF CHOLELITHIASIS*

With Special Reference To Vomiting

BY ROBERT ZOLLINGER, M.D.,† AND EDMUND YOUNG, M.D.†

WE became interested in the symptomatology of cholelithiasis after studying several patients whose pain varied from the typical syndrome of biliary colic. Since the pain is often the result of overdistention of the gallbladder or major bile ducts by a calculus, we attempted to simulate this by mechanical means in conscious patients. By such a method we hoped to study the symptoms produced by distention of the gallbladder as compared with distention of the major extrahepatic ducts. In this report a clinical study, based on our experimental findings, has been undertaken in an effort to evaluate the symptoms of cholelithiasis in relation to the location of the offending calculus.

Our observations consisted of the mechanical distention of the gallbladder or common duct in six patients[1]. Under a short gas-oxygen anesthesia or local infiltration of novocain the stones were removed from the gallbladder or common duct and a sterile balloon was inserted which could be distended and the pressure recorded. When the patient had recovered sufficiently from the anesthesia to answer all questions intelligently the gallbladder or common duct was distended. Distention of the gallbladder produced a feeling of indigestion or deep epigastric discomfort without the usual referred pain to the back or discomfort in the right hypochondrium. Nausea and vomiting did not occur regardless of the degree of distention. Distention of the common duct produced a more severe epigastric distress but again pain was not referred to the back. Inspiratory distress was characteristic of distention of either viscus. The chief difference between distention of the gallbladder and of the common duct was the occurrence of nausea and vomiting with the latter.

The significance of these observations was then determined from a study of the clinical histories of three hundred cases previously operated upon in the Peter Bent Brigham Hospital for cholelithiasis. Particular reference was made to the location of their initial pain and the occurrence of involuntary vomiting. These cases were divided into three groups of one hundred cases each. The first group included only patients with cholecystitis and cholelithiasis who had never been jaundiced and in whom no evidence of cystic or common duct calculus could be found at operation. As far as could be determined in this control group the ducts had not been distended by a calculus, and the symp-

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toms resulted from stones within the gallbladder. All of the second group had acute cholecystitis. The cystic duct was occluded by a stone in forty of these patients, and probably in many more not mentioned in the pathologist's or surgeon's note. The third group of one hundred cases had calculi removed from the common duct at operation.

Table 1 compares the relative frequency of some of the more common symptoms in cholelithiasis as it occurred in the three hundred cases. Involuntary vomiting interested us especially, since it occurred experimentally only when the ducts were dilated. We believed it might prove of value in the differential diagnosis between stones in the gallbladder as compared with the symptoms of stones in the cystic or common duct. By involuntary vomiting we mean spontaneous vomiting and not induced vomiting following nausea. Unless there was a specific statement to the contrary, we considered the vomiting described in the clinical history to be spontaneous. It occurred in twenty-nine of the one hundred cases of chronic cholecystitis without evidence of calculi in the cystic or common duct. Vomiting was found in eighty-five of the one hundred cases of acute cholecystitis. Obstruction in the cystic duct no doubt accounts for the high incidence in this group. As we expected, the highest incidence of vomiting (eighty-nine per cent) occurred in the one hundred cases of proved common duct stone. We believe that the clinical and experimental observations coincided rather closely, in that distention of the ducts does produce vomiting in contrast to its absence in distention of the gallbladder. Obviously it cannot be determined how many cases of vomiting in the group of chronic cholecystitis may have been due to a stone temporarily blocking the cystic duct. These findings suggest that pronounced involuntary vomiting in cases of cholelithiasis often indicates that a stone is impacted in the ampulla of the gallbladder or located in the major extrahepatic ducts. The surgical significance of this observation is apparent and we believe that involuntary vomiting should be added to the commonly accepted list of indications for exploration of the common duct.

TABLE 1

	Cholecystitis and Cholelithiasis		*Common Duct Stone
	*Chronic	*Acute	
	%	%	%
1. Involuntary vomiting	29	85	89
2. Colic	60	80	90
3. Right upper quadrant pain	58	65	63
4. Epigastric pain	37	35	34
5. Left upper quadrant pain	5	0	3
6. Chills and fever	0	12	15
7. Jaundice	0	11	90
8. Average age	47.2	47.1	53.6
9. Postoperative days in hospital	16.7	21.7	22.8
10. Mortality	0	5	12

*One hundred cases.

Attacks of colicky pain occurred in sixty per cent of the cases of chronic cholecystitis and cholelithiasis. The percentage was increased to eighty in acute cholecystitis and ninety in cases of common duct stone. It must be remembered that common duct stones can occur without pain. There is no mention made in these histories of the association of inspiratory distress with colic, but in a study of our recent cases we find it to be associated with gallstone colic in over twenty-five per cent. We are convinced of its diagnostic significance in cases of biliary colic.

Right upper quadrant pain occurred in almost two-thirds of the three hundred cases; left upper quadrant pain or bizarre and atypical localization in about five per cent. On the other hand, epigastric pain appeared as the initial symptom in more than one-third of the cases. Since the epigastric pain was the only type produced by our mechanical distention of the gallbladder or common duct, we believe that this symptom indicates a similar process resulting from a calculus blocking or trying to pass through one of the major ducts. Closer questioning of the patients would undoubtedly elicit the fact that often the onset of pain was localized in the epigastrium. This, we believe to be a visceral type of pain. The high incidence of pain in the right upper quadrant may be accounted for by an associated inflammation of the gallbladder stimulating the adjacent cerebral spinal nerves. We cannot offer a satisfactory explanation for the referred pain to the back so often found in biliary colic.

Jaundice occurred in eleven of the one hundred cases of acute cholecystitis and in ninety of the one hundred cases of common duct stone. We have found involuntary vomiting to occur as often as jaundice in the presence of a common duct stone, and we have occasionally accepted it as the chief diagnostic symptom. A recent or past history of jaundice is an indication for exploration of the common duct. However, it must be remembered that ten per cent of the common duct stones occurred in the absence of jaundice.

Although both chills and fever are usually considered to be inseparably associated with jaundice in the presence of a stone in the common duct, we found to our surprise that they were mentioned in only fifteen of our one hundred proved cases. Close questioning of our recent patients showed that they certainly are not present in over one-third of the cases.

The average age of the one hundred cases of

chronic cholelithiasis and chronic cholecystitis without a history of jaundice was 47.2 years. This average was almost identical with the one hundred cases of acute cholecystitis which was 47.1 years. The patients with common duct stone averaged about six years older, which suggests that the longer the patient carries the stones the greater the chance of a calculus escaping into the common duct. This is an argument in favor of an earlier operation in cases of cholelithiasis. The period of hospitalization was considerably longer in the group of acute cholecystitis (21.7 days) and common duct stone (22.8 days) than in the uncomplicated cases (16.7 days).

The mortality figures demonstrate the seriousness of the complications in cholelithiasis. It so happened that no deaths occurred in the uncomplicated cases, although a few pulmonary complications and wound infections did occur. The mortality rate of the one hundred cases of acute cholecystitis was five per cent. A cholecystostomy was done in eight of the one hundred cases. Sepsis was the etiological cause of death in a greater number than pulmonary complications in this group. The mortality rate of the one hundred cases of proved common duct stone was twelve per cent. We feel, however, that careful exploration of the common duct in itself adds little to the mortality rate. The method described by Cheever[2] was usually employed. Pulmonary complications accounted for seven of the twelve deaths in the latter group.

SUMMARY

Observations are recorded following the distention of the gallbladder or common duct in six patients operated upon for cholelithiasis. The cardinal findings of clinical importance were as follows: (1) Failure by this method to reproduce the usual referred pain to the back, (2) the consistent complaint of inspiratory distress, (3) the absence of vomiting when the gallbladder was distended and the prominence of this symptom when the ducts were distended.

The importance of these findings was tested by a study of the records of three hundred cases of cholelithiasis consisting of one hundred cases of cholelithiasis and chronic cholecystitis with a negative history for jaundice, one hundred cases of acute cholecystitis and one hundred cases of proved common duct stone.

Our observations, which showed that vomiting followed distention of the common duct, were in accord with the clinical findings that distention of the biliary ducts, as by a calculus, produced a high percentage of involuntary vomiting as compared with calculi within the gallbladder. We are suspicious of a calculus in the cystic or common duct in cases having pronounced involuntary vomiting and we believe it should be considered in the group of indications for exploration of the common duct.

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FURTHER CASE STUDIES OF LUMBO-SACRAL PATHOLOGY WITH CONSIDERATION OF THE INVOLVEMENT OF THE INTERVERTEBRAL DISCS AND THE ARTICULAR FACETS

BY CHARLES E. AYRES, M.D.*

INTEREST in the conditions conducive to painful symptoms in the lower back has by no means abated since our last contribution to the subject in 1929[1]. On the contrary, it has increased in considerable degree and so much has the literature been enlarged that one is made increasingly aware of the multitude of possibilities for pathology in this region. Our conclusions in 1929, from the study of thirty-six cases, were that the anatomical structures most concerned in low-back pain were the intervertebral discs, the articular facets, and the 5th lumbar nerve. In the intervening five-year period every angle of the etiology has been investigated. Particularly painstaking researches into the minutest details of the anatomy, normal and pathological, and the physiology of the intervertebral spaces, have been carried on by the German school headed by Schmorl[2]. As so aptly phrased by Calvé and Galland[3], "a new chapter in vertebral pathology has been disclosed: the pathology of the intervertebral disc". Intimately connected with this are destructive processes in the intervertebral articulations and the implication of the 5th lumbar nerve root.

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THE INTERVERTEBRAL DISCS

The intervertebral disc consists of the nucleus pulposus, a central flattened lens of loose fibrous tissue, made up of cartilaginous cells and containing synovia-like fluid under pressure. This central gelatinous mass is held in place by a strong, elastic fibrocartilaginous envelope, the annulus lamellosus, the fibres of which are in continuity with the fibres forming the periphery of the vertebral surfaces. The end surfaces of the vertebrae are covered by a thin layer of cortical bone, quite compact in the center over the nucleus pulposus and more porous peripherally. Over this cortical bone lies the cartilaginous plate, composed of hyaline cartilage, which ends abruptly anteriorly and laterally by abutting the bony epiphyseal ring. A firm connection between the body of the vertebra and the intervertebral

disc is maintained by a marginal rim on the end surface of the vertebra.

The construction of the nucleus pulposus gives to the spinal column its resilient quality. Acting like a spring which is, at the same time, equally under pressure and compression, this elastic, semi-fluid mass takes from the bony surfaces the force of blows and distributes the shock of sudden jars, lessening their effect upon the nervous system. Any pathology, therefore, which interferes with the proper function of the disc as a shock absorber may give symptomatology in this region. Schmorl, commenting on the frequency with which changes in the intervertebral discs occur, says that "with increasing age they become so frequent that after the middle of the sixth decade it is almost impossible to find a spine in which all the intervertebral discs are normal". That such alterations may not always be found in those doing hard physical labor but may appear in severe form in brain workers suggests that disturbances in metabolism and endocrine disorders may, at times, enter the picture. Schmorl has differentiated three forms which changes in the discs may assume: (1) a drying of the tissue of the disc; (2) an increased moisture in the tissue, inducing gross fissure formation and ultimately destruction of the disc; and (3) the occurrence, primarily, of fissures in the discs. In the drying process the volume of the disc is decreased and the tissue becomes brittle and crumbly.

Pathology in the disc may also assume the form of a displacement of the intervertebral tissue, which may protrude in nodular excrescences through fissures in the cartilaginous plates. Through the tension of the nuclear tissue, these small villi are pressed into defects in the cartilaginous plates and thence into the spongiosa of the vertebral bodies. If they occur on the posterior surface of the intervertebral disc, they may extrude into the spinal canal, possibly irritating the spinal cord and even, at times, inducing paralysis. Such nuclear hernias or prolapses may cause proliferation of cartilaginous tissue, which may calcify and finally become ossified. Prolapses of the nuclear tissue in young people may lead to kyphosis. In adults they are not conducive to curvature, first because the cartilaginous nodules develop, for the most part, only in a single disc; secondly, because much less tissue prolapses on account of the decreased expansion in the region of the nucleus; and thirdly, because the growth of the vertebral bodies has ceased and therefore the kyphosis seen in youth through ossification disturbances can no longer take place. The most significant changes are secondary to nodule formation and consequent upon the resulting destruction of the nucleus and the obliteration of the joint space. The two cartilaginous plates are then brought into juxtaposition.

Keyes and Compere[4] remark that "if only a small portion of the nucleus pulposus is extruded, the function of the disc may not be seriously affected, but the extrusion of even small amounts may lead to an earlier than usual dehydration of the disc and therefore diminished function at an earlier age. Such small ruptures may thus be a predisposing etiological factor in the development of arthritis of the spine later. If so much fluid escapes that the nucleus pulposus is destroyed, the axis of motion is shifted posteriorly to the articular facets and the weight of the body is transferred to the lateral or anterior portion of the vertebral bodies."

Weaver[5] believes that rupture of the nucleus pulposus would require considerable force and that, consequently, rupture due to sudden

FIG. 1. Dissection of lumbo-sacral area.

trauma is probably rare. Of more frequent occurrence, on the other hand, is narrowing of the disc due to mild, continuous trauma, such as faulty posture, which throws a continuous strain on the lumbosacral junction.

Calvé and Galland note, among the changes which may take place in the intervertebral discs, calcification of the nucleus. In this condition the cells of the nucleus are necrosed and the fibrous tissue destroyed by calcareous deposit. A satisfactory explanation for this calcification, they say, has never been given. These authors, like Schmorl, have observed herniation of the nucleus pulposus into fissures in the cartilaginous plates, with resultant rarefaction and destruction of the bone.

On the other hand, destruction of the intervertebral discs may be secondary to pathological conditions in the vertebral bodies, as in os-

teomalacia, generalized osteitis fibrosis or senile osteoporosis. Schmorl says that while primary metastatic affections of the healthy intervertebral discs of adults cannot occur because the discs have no blood supply and therefore cannot be infected through the blood stream, nevertheless suppurations in the region of the disc may attack and destroy it.

Böhmig[4], through his study of the blood supply to the intervertebral discs in the embryo and in youth, is convinced that the growing disc is much more intimately concerned in the circulation of the blood and in metabolism than has previously been recognized. They may share, therefore, up to the beginning of the twentieth year, in all general diseases of the body; in disturbances of metabolism and infectious blood diseases (bacteremia, sepsis, typhus, etc.). So it is realized that theoretically all metastatic processes may be present in the intervertebral discs although practically Schmorl has not yet been able to produce such findings in all of his considerable material. There is, Böhmig believes, a possibility of postinfection diseases of the intervertebral discs in the young after grippe and staphylococcic and streptococcic infections. Böhmig also found that the formation of cartilaginous nodules, as described by Schmorl, most often took place at the site of the present or former blood-vessel canals. This author also accounts for anomalies in the form of the nucleus pulposus by the fact that the intervertebral chordal segment is the matrix of the nucleus pulposus and gross and microscopic anomalies of form of the chorda have an extraordinary significance in the development of the nucleus pulposus. Every displacement of the parts of the notochord, every segmentation of its cell complex leads to a diminution of the material for the formation of the gelatinous mass and therefore anomalies in the form of the nucleus pulposus follow. This is most important as regards the statics and dynamics of the vertebrae.

THE ARTICULAR FACETS

So closely related are the anatomical structures in the intervertebral spaces that one part, or all, may share in the destructive process. Secondary to thinning of the intervertebral discs there may be changes in the articular processes of the vertebrae. Keyes and Compere were able to produce experimentally in animals complete disappearance of the disc and sclerosis with spur formation and lipping of the adjacent bone surfaces by injury to the nuclear material. In every instance where nucleus pulposus material had been permitted to escape, there was definite narrowing of the intervertebral disc and when most of the nucleus was curetted out, the adjacent vertebrae showed early changes of typical hypertrophic or osteoarthritis of the spine and fibrosis of the material remaining in the space previously occupied by the nucleus pulposus. Williams[7] says that with herniation of the nucleus pulposus and loss of the intervertebral space, owing to settling of the vertebrae, there is, in turn, partial subluxation of the articular facets and diminution in the diameter of the intervertebral foramina. The axial force and pivoting which formerly came on the resilient nucleus pulposus must now fall on the inelastic superior surface of the first sacral segment. As motion

FIG. 2. Lumbo-sacral area showing relation of fifth root to lumbo-sacral facet.

continues, a pressure atrophy results and the body surfaces may be scarred and narrowed.

In a paper by Williams and Yglesias[8] they divide their cases into two classes: (1) those in which there is a complete loss of the disc, and (2) a group showing only narrowing of the disc posteriorly. In the second class, they find, the mechanical alteration in the region of the articular facets and foramina with consequent irritation of the 5th lumbar nerve root, is as great, if not greater, than in the first group. With loss of the intervertebral disc and subluxation, the inferior facets of the 5th lumbar vertebra move down and backward, thereby closing off the foramina and causing pressure on the 5th lumbar nerves.

Ghormley[9, 10, 11] mentions the fact that the articular facets are the only true joints in the spinal column, a point brought out by the writer in 1929. Hyaline cartilage covers their surfaces and synovial membrane lines their articular capsules. The degenerative changes, therefore, which are characteristically seen in hyaline car-

tilage may be found in the articular cartilage of these facets. This degeneration may go on to complete loss of the cartilaginous surface and irregular hypertrophy of the margins, similar to that encountered in the advanced stages of degeneration or hypertrophic arthritis of other joints. With narrowing of the intervertebral discs there is overriding of the surfaces of the facets and with this abnormal contact, traumatic arthritis is set up. Ghormley believes the sciatic pain in these cases to be more likely caused by pressure on the nerve or nerve sheath excited by the facet than by the intervertebral disc.

FIG. 3. Cross section of spine at lumbo-sacral joint showing intimate relation which fifth lumbar nerve root bears to facets and lumbo-sacral cartilage.

The degree to which the facet may be involved in any inflammatory process in the intervertebral spaces and the character of the changes are strikingly brought out by the pathological report on a specimen of tissue from the lumbosacral facets in one of our cases (No. 78), which was as follows: "Sections of the soft tissue show a dense stroma with some round cell infiltration and much fibrosis change. Some areas show calcification and bone formation. Sections of the decalcified bone show moderate round cell infiltration and many fat cells, evidence of chronic inflammatory changes. Diagnosis: Chronic inflammatory tissue, beginning calcification and ossification." (Dr. P. Beregoff.)

Willis[12] points out the frequency with which anomalies of the vertebrae occur and says the last presacral vertebra shows a tendency to variability in its transverse processes and articulations with the sacrum. Junghanns[13] calls attention to the fact that the 5th lumbar is not always the last presacral vertebra as there may be an anomalous number of vertebrae with displacement of the various segments of the column. All such anomalies predispose the lumbosacral region to pathology.

Baastrup[14] emphasizes the importance of the spinous processes in painful conditions of the back. "The lumbar vertebrae form," he says, "a mutual system of leverage with the axis posterior to the middle of the vertebrae. Therefore, the spinous process is the short lever arm in the system. Under special conditions they may be pressed against each other with great force, the soft parts between them sharing in this process. If this compression is continued, the spinous processes themselves become the site of osteoarthrotic pathological changes. As a result may be seen obliquely placed spinous processes, faceted contact surfaces, osteosclerosis of the bony tissue surrounding the contact surfaces, anomalous contact surfaces, osteophytes at the ends of the articulations, 'mouse' formation and ankylosis. In attempting to compensate for this, there is constant strain on the musculature." The number of cases in our own series in which the spinous processes were involved was too small for us to speak with much authority on this point.

CLINICAL FINDINGS

Since our report in 1929, a series of sixty-three new cases have been operated upon. A study into the symptomatology of these patients (nearly twice the number reported upon previously) substantiates the statements then made in regard to the clinical findings in these cases of lumbosacral pathology. These are as follows: usually a list to one or the other side; marked tenderness at the lumbosacral junction, although palpation may be difficult and the tenderness masked in muscular patients with severe contraction of the erector spinae; in most cases, distinct tenderness over the gluteus medius just below the crest of the ilium; in some instances, tenderness in back of the trochanter, in the region of the gluteal fold; burning pain along the outside of the thigh corresponding to the tensor fasciae femoris; and in severe cases, burning pain involving the outside of the calf and extending beneath the external malleolus and down to the dorsum of the foot. Whether there is atrophy depends upon the severity of the involvement as well as its duration. In our complete series of ninety-nine cases we found considerable variation in the duration of the symptoms. One patient (reported in our first series) complained she had had her symptomatology "all her life". The longest stated period was thirty-five years, the shortest, four weeks, and the average a fraction over two years.

FIFTH NERVE ROOT INVOLVEMENT

The clinical findings, as stated in our previous paper, are adequately accounted for by the anatomical position of the 5th lumbar nerve root and the distribution of its branches. Lying, as it does, between the lumbosacral intervertebral disc and the lumbosacral articular facets, it is liable to involvement in any inflammatory process which attacks either the disc or the facets. Pain then occurs along the course of its branches; the 5th root fibres to the gluteus medius and gluteus minimus giving pain just below the crest of the ilium and in the region of the trochanter and outer aspect of the buttock; the fibres to the tensor fasciae latae causing pain along the outside of the thigh; the fibres to the semitendinosus, semimembranosus and biceps giving the symptomatology down the back of the thigh; and the fibres to the crural groups of muscles involving the calf and dorsum of the foot. Continued study of the subject impresses upon us even more forcibly the frequency with which pain radiated down one leg or both. In our entire group of ninety-nine cases, eighty-one patients had pain in the legs; fifty-eight of these in one leg or the other and twenty-three in both legs. Putti[15] has called this type of sciatica which is secondary to some abnormal condition in the spinal column "vertebral sciatica" and says that in 345 cases of lumbar arthritis examined during ten years at the Institute Rizzoli, sciatica was present in 231. Williams notes that the quadratus lumborum and multifidus spinae receive part of their innervation from the 5th lumbar nerve through the posterior perforating branches. This may be an important factor, he says, in muscle spasm of the lower part of the back and, associated with reflex spasm of the psoas muscle, probably explain the spinal rotation and list seen in arthritic irritation. The earliest symptoms of nerve root irritation are likely to be gluteal pains and tenderness, usually interpreted as sacroiliac pathology, but which, he believes, are due to irritation of the superior gluteal nerve through the 5th lumbar segment. The fibers of the superior gluteal nerve are peripherally placed within the 5th lumbar nerve root and are therefore the first to register irritation.

TREATMENT

We have continued to use the Hibbs fusion operation, the technique of which is outlined in our previous article. The results have been almost uniformly excellent (as will be seen in the analysis of our cases), and this operation has the advantage of keeping the patient hospitalized for only ten days or two weeks, at the end of which time, a plaster jacket is applied in extension with a pelvic belt having two straps so as to rotate the pelvis posteriorly and bring the sacrum into proper alignment with the spinal column, that is, to make the superior or bearing surface of the sacrum as horizontal as possible. The patient is then allowed to go home and wears the plaster jacket for six weeks, when it is removed and a spring back brace which extends up to include the shoulders is fitted to him.

In none of our cases has facetectomy been deemed necessary. To attempt this step at the time of the fusion operation is to encounter the danger of involving the 5th nerve root in a mass of callus formation, thus nullifying the results of the fusion. On the other hand, if facetectomy is performed as a secondary operation, it becomes a difficult procedure to reach the facet after the fusion has formed.

Williams and Yglesias have performed the fusion operation in thirteen cases within eighteen months with complete relief of symptoms in all the cases but one. In this case pain persisted along the course of the left sciatic nerve, which, it was felt, was due to constriction of the foramen between the 5th lumbar and 1st sacral vertebrae, with irritation of the 5th nerve segment. Therefore, at a second operation the left inferior articular facet of the 5th lumbar vertebra was removed and also the sacral facet, and the nerve freed from surrounding tissue from the point at which it emerged from the neural canal. The patient made a perfect recovery.

ANALYSIS OF CHARTED CASES

Ninety-nine cases have been studied, which may be divided as follows:

Cases with thinning of the disc (shown by x-ray)	59
Cases with lumbosacral involvement without discernible thinning of the disc	31
Spondylolisthesis	6
Sacralization	1
Impingement of spinous process	2
	99

Of the fifty-nine cases with thinned discs, fifty-two had pain referred to the legs and seven had no pain in the legs. Of the lumbosacral cases without thinning of the disc, thirty-one in all, twenty-three patients complained of pain in the legs and eight did not. The patient with sacralization did not have leg pain and the two patients with impingement of the spinous process complained of no pain in the legs.

We have been able to follow ninety-three of our patients and have the subjoined data:

1	patient	is	well	at	the	end	of	a	10	year period
4	patients	are	"	"	"	"	"	"	9	" "
14	"	"	"	"	"	"	"	"	8	" "
17	"	"	"	"	"	"	"	"	7	" "
3	"	"	"	"	"	"	"	"	6	" "
15	"	"	"	"	"	"	"	"	5	" "
19	"	"	"	"	"	"	"	"	4	" "
1	patient	is	"	"	"	"	"	"	3	" "
6	patients	are	"	"	"	"	"	"	2	" "
80	patients									

Eighty of our patients, therefore, have been heard from and are well from two to ten years after operation.

Of the remaining nineteen patients, one has died, one was well for eight years and then developed Paget's disease, one was well for a year and a half and after that could not be traced, six have been lost track of entirely, and ten still complain of pain.

Of the ten patients still complaining of pain, four are patients who showed thinning of the disc by x-ray (Nos. 28, 30, 55 and 96 on the chart), four are lumbosacral cases with no thinning of the disc discernible by x-ray (Nos. 37, 42, 46 and 51 on the chart), and two are cases of spondylolisthesis (Nos. 47 and 83 on the chart).

Two of these ten patients reported for study, one a lumbosacral case without thinning of the disc (No. 37) and one (No. 55) with intervertebral disc thinning. Case No. 37 was found to have solid fusion but had a large ventral hernia recurring in the scar of a previous abdominal operation. From the examination it appeared that her back symptoms were related to this condition. Case No. 55 was operated upon in 1928 and remained well for four years, when the symptoms recurred following heavy lifting. He did not have a return of the sciatic symptoms and x-ray showed a probable pseudoarthrosis.

CONCLUSIONS

A group of ninety-nine patients with lumbosacral symptomatology has been analytically investigated. The end results are known in ninety-three cases and in eighty the results of operation have been excellent. The earliest of these cases was operated on in 1924 and thirty-six of them previous to 1929, so that we have the results of at least a five-year period in all this earlier group and in some cases the postoperative period is as long as ten years. In addition, we have the results in a larger group of sixty-three cases, some of them operated upon four years ago. We feel, therefore, that we have convincing evidence of the soundness of our theory of the etiology of lumbosacral backache and the efficacy of the Hibbs fusion operation as the preferred mode of treatment. Our further study of the subject, over a period of five years since 1929, has served to corroborate the conclusions drawn at that time, namely, that:

(1) A destructive process of the lumbosacral cartilage is a common finding in cases of low-back pain.

(2) An arthritic involvement of the lumbosacral facets may alone cause symptoms of back pain and sciatica.

(3) Ankylosis is indicated.

(4) The results of fusion by the Hibbs method are satisfactory in cases that do not respond to conservative treatment.

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TRICHOBEZOAR*

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WE have recently had the opportunity of studying and operating on a case of hair ball of the stomach. Because of the rarity of this condition, this case is reported in full.

G. P., eleven year old female, was admitted to the Beth Israel Hospital, October 6, 1934. During the preceding two years the patient had had dull epigastric pain with an acute exacerbation three days before admission, accompanied by nausea and vomiting of unchanged food particles. Intermittent, sharp epigastric pain persisted up to the time of admission. The past history revealed that the patient had always been underweight and had had several intercurrent infections; namely, bronchopneumonia at two and one-half years of age; pyelitis at seven years, which confined her to bed for seven months.

Physical examination revealed a temperature of 100° F. rectally, pulse 84, respirations 20 and weight

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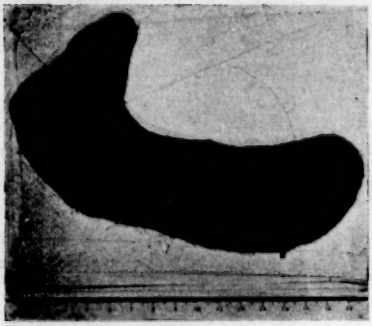
No.	Patients	Sex	Age	History of Injury	Duration of Symptoms	Referred Pain	Date of Operation	Relief of Symptoms	Follow Up Date	2nd Follow Up Date	X-Ray Findings
1.	J. B.	M.	35	Injury	3 months	One leg	6-23-24	6 weeks	10-24-28	6-1-34	Thin disc
2.	N. D.	F.	51	Injury	35 years	Left leg	1-12-25	At once	7-20-28	6-1-34	Thin disc
3.	A. K.	M.	34	Strain	One year	Both legs	4-30-25	At once	8-20-28		Thin disc
4.	J. S.	M.	36	Strain	2 years	Right leg	6-22-25	At once	7-20-28	6-1-34	Thin disc
5.	G. L.	M.	28	Strain?	13 months	Right leg	12-2-25	3-4 months	7-20-28	6-18-34	Thin disc
6.	M. G.	F.	28	Strain	4 months	Left leg	12-19-25	At once	8-20-28	7- -34	Thin disc
7.	W. A.	M.	42	Strain	10 years	One leg	12-30-25	At once	7-20-28	6-1-34	Thin disc
8.	A. S.	M.	34	Strain	3 months	One leg	1-29-26	At once	7-20-28	6-1-34	Thin disc
9.	J. D.	M.	33	Strain	2 years	No	2-13-26	One month	7-20-28	6-1-34	Arth. of facets
10.	J. W.	M.	50	Strain	10 years	Both legs	2-24-26	At once	8-20-28	6-1-34	Thin disc
11.	R. B.	M.	36	Injury—strain	6-7 years	Right leg	3-15-26	Slight—one year	7-20-28	6-1-34	Thin disc
12.	M. H.	F.	38	?	Number of years	One leg	4-8-26	At once	7-20-28	6-1-34	Thin disc
13.	A. T.	F.	43	Strain?	3 years	Left leg	5-7-26	Slight pain 9 weeks	8-20-28	6-1-34	Arth. L. S. facets
14.	F. A.	M.	56	Strain	4-5 months	One leg	7-9-26	4 months	8-20-28	6-1-34	Arth. L. S. facets
15.	C. G.	M.	45	Strain	12 months	Left leg	9-25-26	3 months	7-20-28		Thin disc
16.	W. C.	M.	49	Strain	12 years	Right leg	10-10-26	7 months	7-20-28	6-23-34	L. S. arthritis
17.	J. M.	M.	32	Injury	One year	Right leg	10-30-26	3 months	7-20-28		Thin disc
18.	E. T.	M.	31	Injury	9 weeks	Left leg	2-7-27	At once	7-20-28	6-1-34	L. S. arthritis
19.	M. B.	F.	36	Injury	15 years	Right leg	11-11-26	One year	8-1-28	6-1-34	Thin disc
20.	N. H.	F.	50	?	6 years	Both legs	1-21-27	3 months	7-25-28	6-1-34	Thin disc
21.	B. R.	M.	42	Strain	6 weeks	Right leg	3-15-27	3 months	7-20-28		Thin disc
22.	H. G.	M.	40	Strain	4 weeks	Left leg	3-18-27	2 weeks	7-25-28	6-1-34	Thin disc
23.	J. V.	M.	45	Strain	4 months	Left leg	3-19-27	2 months	8-20-28	1-25-33	Spondylolisthesis
24.	G. W.	M.	58	Injury	3 months	Left leg	3-22-27	At once	7-25-28		Thin disc
25.	I. K.	F.	35	Strain	2 months	No	4-8-27	At once	7-25-28	6-2-34	Sacral. Rt. L. S. Arth.
26.	O. L.	F.	35	Gradual	2 years	No	4-9-27	3 months	7-25-28	6-1-34	L. S. arthritis
27.	I. D.	F.	24	Strain	2 years	No	5-3-27	2 months	7-20-28	6-23-34	Sacralized
28.	A. M.	F.	41	Injury	5 months	No	5-12-27	Slight pain now	7-25-28	6-1-34	Thin disc
29.	T. D.	M.	45	?	3 months	Right leg	1-16-28	6 weeks	7-27-28	6-18-33	Thin disc
30.	L. M.	F.	45	?	7 years	Left leg	6-17-27	No relief	7-25-28	6-1-34	Thin disc
31.	F. S.	F.	50	?	Several years	Right leg	6-30-27	One year	7-25-28	6-1-34	Thin disc
32.	L. V.	F.	46	Injury	1½ years	One leg	9-12-27	5-6 months	7-25-28	6-1-34	Thin disc
33.	H. J.	F.	44	Strain	9 weeks	One leg	9-28-27	3 months	7-27-28	6-1-34	Thin disc
34.	S. D.	M.	37	Strain	? months	Right leg	1-7-27	3 months	8-20-28	6-1-34	Thin disc
35.	A. D.	F.	24	?	Chronic—acute 4 years	Both legs	11-11-27	At once	8-20-28	6-1-34	Spondylolisthesis
36.	D. M.	M.	40	Strain	15 years	One leg	12-5-27	4 months	7-27-28	6-1-34	Thin disc
37.	C. D.	F.	34	?	?	Right leg	4-18-25	No relief	5-25-34		L. S. arthritis
38.	A. H.	F.	24	?	8 years	No	7-24-26	Immediately	5-25-34		Impingement spinous process
39.	J. D.	M.	36	?	?	No	7-30-26	One year	7-1-34		Impingement spinous process
40.	M. M.	F.	32	Fall	One year	Right leg	12-1-26	At once	5-25-34		Exagg. L. S. Angle. Arth. facets
41.	J. S.	F.	48	?	5 weeks	Left leg	12-23-26	2 years	8-21-28	6-1-34	Arthritis of facets
42.	E. S.	F.	25	?	6 years	No	1-20-27	Pain above op.	6-1-34		Arthritis of facets
43.	A. F.	F.	19	Strain	5 years	No	2-7-27	1½ years	8-20-28		Exagg. Angle 6th L. Arth. facets
44.	S. J.	F.	34	Fall	6 years	Both legs	5-7-27	6 months	7-25-28	7-1-34	Lumbo-sacral
45.	S. S.	F.	33	?	6 months	Both legs	6-4-27	3 months	5-5-34		Sacralized 5th—thin disc
46.	M. B.	F.	47	Injury	5 months	Right leg	9-1-27	Slight pain now	7-25-28	7-1-34	Exaggerated lumbo-sacral
47.	G. P.	M.	56	Strain	6 months	Both legs	9-9-27	Slight pain now	7-25-28	6-1-34	Spondylolisthesis
48.	A. G.	M.	33	Injury	One year	Left leg	10-8-27	Immediately	7-27-28	6-1-34	Arthritis of facets
49.	R. D.	F.	23	?	5 or 6 years	No	10-26-27	6 months	8-8-28	6-1-34	L. S. facets
50.	A. T.	F.	42	Strain	4 months	Left leg	10-29-27	Immediately	5-25-34		Spondylolisthesis
51.	M. T.	F.	21		4 months	No	11-22-27	Slight pain now		5-25-34	Exagg. L. S. Angle—Arth.
52.	I. W.	M.	34	No	Years	Right leg	12-16-27	6 weeks		6- -34	Thin disc
53.	J. P.	M.	35	Strain	2 years	Right leg	1-16-28	6 weeks	7-27-28	1-18-33	Thin disc
54.	R. K.	M.	27	Injury	2 years	No	1-20-28	Immediately	7-27-28	1-25-33	Thin disc

55.	[illegible]	[illegible]	[illegible]	Injury	One year	Right leg	[illegible]	[illegible]	[illegible]	[illegible]	Thin disc
56.	F. W.	M.	49	Not known	6 months	Right leg	1-21-28	2 or 3 months	7-27-28	1-18-33	Thin disc
57.	M. P.	F.	48	Fall	Always	No	2-9-28	Immediately	7-27-28	1-18-33	Thin disc
58.	T. L.	M.	50	Injury	2 years	Left leg	2-14-28	9 months	7-20-28	1-18-33	Thin disc—4th and 5th
59.	V. R.	F.	37	Injury	Many months	Both legs	3-19-28				Thin disc
60.	J. McC.	M.	45	Strain	10 years	No	3-20-28	2 months	7-27-28	1-18-33	Thin disc
61.	H. P.	F.	35	Not known	One year	One leg—hip	3-27-28	Immediately	7-27-28	6-28-34	Thin disc
62.	O. M.	F.	37	Strain	5 years	Both legs	4-11-28	One year	1-18-33		Exagg. L. S. Angle—Arth.
63.	F. F.	M.	29	Not known	10 or 12 years	No	4-17-28	Immediately	1-30-33		Arthritis of facets
64.	G. F.	M.	34	Not known	One year	Both legs	6-5-28	Almost immediately	1-6-33		Arthritis of facets
65.	B. D.	F.	30	No	One year	Left leg	6-6-28	6 months	5-29-34		Thin disc, part. sacral
66.	D. C.	F.	37	No	?	Right leg	6-8-28	Yes	12-28-32		Arthritis of facets
67.	E. J.	F.	35	Injury	1½ years	Right leg	6-9-28	One year entirely	1-11-33		Thin disc
68.	S. S.	F.	36	No	All her life	Right leg	10-16-28	3 months	1-12-33		Arthritis of facets
69.	J. J.	M.	29	Strain	Jan., 1923	Right leg	11-12-28	2 months	1-1-33		Spondylolisthesis
70.	C. M.	F.	25	Injury	5 years	Both legs	11-10-28	2 years	1-1-33		Exagg. L. S. Angle—Arth.
71.	M. T.	F.	45	No	Chronic yrs.—acute 2 mos.	Right leg	1-26-29	One month	1-1-33		Arthritis of facets
72.	G. M.	M.	27	Strain	2 years	Right leg	2-25-29	About 2 weeks	1-6-33		L. S. Arth. of facets
73.	J. P.	F.	27	No	One year	Left leg	3-13-29	Immediately	5-29-33		Thin disc
74.	M. T.	F.	36	No	Several years	Left leg	5-2-29	9 or 10 days	1-1-33		L. S. Arth. of facets
75.	S. C.	F.	33	Injury	4 years	No	6-12-29	Immediately	1-1-33		Thin disc
76.	G. B.	M.	21	Injury	2 months	Left leg	6-13-29	2 years entirely	1-12-33		Thin disc
77.	J. K.	M.	24	Strain	About 2 years	Right leg	6-19-29	About one year	1-4-33		Thin disc
78.	E. M.	M.	28	Injury	3 months	Left leg	7-12-29	About one month	1-1-33		L. S. Arth. of facets
79.	E. C.	F.	26	Injury	Jan., 1917	Left leg	7-13-29	Immediately	12-29-32		Thin disc
80.	T. C.	F.	18	No	Months	Both legs	9-20-29	Immediately	12-29-32		L. S. Arth. of facets
81.	G. T.	M.	45	Strain	9 or 10 years	Left leg	9-20-29	4 to 6 months	12-29-32		Thin disc
82.	J. B.	M.	51	Strain	Long time	Left leg	10-11-29	Immediately	1-1-33		L. S. arthritis
83.	B. C.	F.	30	?	7 years	Right leg	11-15-29	Not relieved	1-1-33		Spondylolisthesis
84.	R. A.	M.	29	?	3 months	Left leg	11-16-29	5 months	1-1-33		Thin disc
85.	E. P.	F.	36	No	2 years	Right leg	11-23-29		12-30-32		Thin disc
86.	W. G.	M.		Fall	3 years	No	11-27-29	Immediately	1-18-33		Thin disc
87.	E. T.	M.	54	Strain	6 months	Left leg	12-13-29	6 weeks	3-11-33		Thin disc
88.	M. G.	F.	26	Fall	6 years	Left leg	1-17-30	3 weeks	6-1-34		Thin disc
89.	L. M.	M.	35	Strain	10 months	Left leg	3-3-30	Immediately	6-6-34		Arthritis of facets
90.	M. M.	M.	52	Strain	10 years	Left leg	4-2-30	3 months	6-1-34		Thin disc
91.	T. C.	M.	34	Strain	6 months	Both legs	11-29-30	5 weeks	6-1-34		Sacralized thin disc
92.	J. W.	M.	40	Injury	9 months	Left leg	2-24-31	2 months	6-1-34		Arthritis of facets
93.	M. S.	F.	36	?	3 years	Right leg	10-21-31	3 or 4 weeks	12- -32		Thin disc, 4th and 5th
94.	A. J.	F.	32	Strain	Some time	Both legs	10-22-31	One year	6-3-34		Thin disc
95.	H. T.	F.	48	Fall	18 years	Right leg	5-25-32		6-1-34		Thin disc
96.	A. C.	F.	45	?	June, 1929	Left leg	10-20-32	Slight pain	6-1-34		Thin disc
97.	F. H.	M.	57	Fall	One month	Right leg	10-25-32	One month	6-1-34		Thin disc
98.	W. G.	M.	50	Strain	7 years	Right leg	12-17-32	Immediately	6-1-34		Thin disc
99.	H. H.	M.	46	Strain	8 years	Left leg	8-22-32	Two months	6-18-34		Thin disc

55 pounds. The patient was a frail, slightly undernourished girl with obvious pallor. She had an apparently normal mental development. Her breath was quite foul. The scalp showed some scaly crusts and a sparsity of hair. Abdominal examination revealed a mass in the left upper quadrant which was about 8 cm. long and 4 cm. wide in the shape of a J. The mass was non-tender, freely movable and moved with respiration. Clinical pathology revealed a red blood count of 4,250,000, Hb. 8 per cent and a white count of 10,600. Hair was observed in the stools twice preoperatively. A G. I. series on October 9, 1934 revealed a large atonic stomach with marked pylorospasm and a mottled appearance with some residue after six and twenty-four hours. A flat x-ray film of the abdomen revealed displacement of the transverse colon downward.



On October 17 the patient was operated on by Dr. C. G. Mixter and on exposing the interior of the stomach through a two-inch vertical gastrotomy incision, a hair ball was observed forming a complete cast of the stomach. This was removed and the incision closed. The patient made an uneventful convalescence and was discharged November 2, 1934.

COMMENT

The last complete review of trichobezoar was was written by Maes[1] in the *Annals of Surgery*, October, 1928, at which time he reported 119 cases. Other complete studies were published by Butterworth[2] and Matas[3].

This condition occurs usually in young girls who display a normal mentality but a perverted appetite. The following are aids in diagnosis: (1) age and sex of the patient, (2) personal habits, for example, hair chewing, (3) careful search of the stools for hair and (4) x-ray studies which reveal a mobile mass conforming to the shape of the stomach and showing a mottled appearance on the six-hour plate. The physical findings and history in this case are quite typical of the disease. It should be emphasized that at the time of operation a careful search for multiple hair balls should be made inasmuch as one or more may be lodged in the small intestine. The largest trichobezoar, which was reported by Davies, is reputed to have weighed six and one-half pounds.

Phytobezoars or food balls are usually composed of cocoanut, vegetable or salsify fibres, but most commonly, of persimmon seeds. The symptoms are more severe with phytobezoar than with trichobezoar and are characterized by a severe gastroenteritis with abdominal pain, fever, and occasionally occult blood in the stools and in the vomitus. Moreover, the patient harboring the food ball is predominantly of the male sex and most commonly of the age group between forty and sixty years. Ulceration with subsequent perforation and peritonitis is more frequently observed with the phytobezoar. The operative mortality of bezoars in general has been estimated to be about four per cent by Maes and the causes of death are attributable to intestinal obstruction, or perforation followed by peritonitis and inanition.

SUMMARY AND CONCLUSIONS

A complete history of another case of trichobezoar has been reported. The differentiating features of trichobezoar and phytobezoar have also been presented.

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CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 21411

PRESENTATION OF CASE

A fifty-two year old single Canadian bookkeeper entered complaining of shortness of breath upon exertion and change in her bowel habits.

One year before entry she had a severe attack of loose, watery, mucus-containing stools several times a day which cleared up in about ten days. Since then she had been slightly constipated and her stools had been small in caliber. Three and a half months before entry she had a similar but less severe attack. At this time she had a few night sweats but had had none since. Ten days later she noticed the onset of shortness of breath upon slight exertion. There was no cough or sputum. At that time she entered a hospital where her chest was tapped. She returned two weeks later to that hospital for another chest tap. During the six weeks before entry she had three more paracenteses. Approximately two months before entry she noticed abdominal swelling and a sense of pressure in the epigastrium which was more marked when sitting. This abdominal swelling had decreased with salyrgan treatment. Her appetite had decreased during this illness but had improved somewhat during the past month. At the time of admission she felt quite comfortable. Her chest had been tapped three days before entry and salyrgan had decreased her abdominal swelling.

Her family history is non-contributory.

Nine years before entry she was "run-down," due to hard work and long hours. At this time she noticed blood in her mouth on several occasions and on her pillow in the morning. A physician told her that she had a spot on her lung and she remained at home for two and a half months. Reëxamination at that time was said to have been normal. The remainder of her past history is non-contributory. Her menopause had occurred about five years before entry.

Physical examination showed a well-developed and fairly well-nourished woman lying flat in bed. The right chest expanded very little and was flat to percussion both anteriorly and posteriorly. The breath sounds were very distant. There was no fremitus. The upper half of the left chest was hyperresonant and the breath sounds were prominent. The heart was displaced to the left. The sounds were of good quality. The abdomen was soft and distended and showed a fluid wave and shifting dullness.

The temperature was 98°, the pulse 100. The respirations were 20.

Examination of the urine was negative except for a slight trace of albumin. The blood showed a red cell count of 4,230,000, with a hemoglobin of 65 per cent. The white cell count was 13,600, 78 per cent polymorphonuclears. The sputum was thin, mucoid and contained rare Gram positive cocci. Four sputum examinations were negative for tubercle bacilli. The stools were soft, light brown in color and showed consistently negative guaiac tests. The nonprotein nitrogen of the blood was 39 milligrams per 100 cubic centimeters, the chlorides 95 cubic centimeters of N/10 Cl. The serum protein was 7.1 per cent. A Hinton test was negative.

X-ray examination of the chest showed that the entire right lung field was obliterated by dense homogeneous dullness which extended up to the first interspace. The shadow of the heart showed only a slight amount of displacement. There was no evidence of metastatic disease in the bones or ribs. A gastrointestinal series was negative.

On the third day 2,300 cubic centimeters of clear yellow fluid was withdrawn from the right pleural cavity and replaced by 1,500 cubic centimeters of air. The fluid had a specific gravity of 1.019. The cell count could not be determined because the fluid was clotted when received. A smear showed many red blood cells and lymphocytes. A culture gave Gram negative and positive bacilli. A guinea pig inoculated with this fluid was negative for tuberculosis.

An x-ray of the chest following paracentesis and the introduction of air showed no lung tissue in the upper two-thirds of the right lung field. There was a straight fluid level extending about two inches above the diaphragm. The findings were those of hydropneumothorax with complete collapse of the right lung.

On the twelfth day about 5 liters of yellowish clear fluid was removed from the abdomen. A cell count gave 725 red blood cells, 20 white blood cells and 155 epithelial cells. A culture showed no growth. Following this paracentesis an irregular mass, presumably the liver, was easily felt in the right upper quadrant. On pelvic examination a large, hard, tender, retroverted and recessed uterus was found. On the fourteenth day an exploratory laparotomy was performed.

Following operation the patient's condition remained the same except that there was no ap-

parent accumulation of either abdominal or chest fluid. She was discharged three weeks after operation at which time practically all her chest and abdominal fluid had disappeared.

Differential Diagnosis

Dr. Richard H. Miller: I have read this over and the logical diagnosis, it seems to me, is so obvious and simple that I cannot help suspecting Dr. Mallory of having dug a pit for me to fall into. We shall see.

Shortness of breath occurred, for which she had to have her right chest tapped, and that was done several times before she came to this hospital. Also, shortly before her entry, she noticed her abdomen getting larger. Therefore, we have to find one cause for fluid in the right chest and fluid in the abdomen.

Nine years before entry she was thought to have tuberculosis which may have been moderately active but it presumably became quiet, if not entirely healed. However, one has to consider tuberculosis in making the final diagnosis.

When she came in here it was perfectly obvious that the right side of the chest was filled with fluid, pushing the heart over to the left, and there was also fluid in the abdomen, but no fever.

The various laboratory data are not particularly helpful until we get down to the examination of the fluid. The x-ray shows fluid but nothing else.

From the right chest there was withdrawn this fluid which clotted very quickly and contained red blood cells and lymphocytes. A guinea pig was inoculated and the result was negative. Then later on the abdomen was tapped and five liters of fluid containing blood cells and epithelial cells was withdrawn. The fluid showed no growth on culture.

The next matter of importance is the pelvic examination which you see demonstrates a large, hard, tender, retroverted and recessed uterus.

The outstanding features in this case are fluid in the chest containing blood cells and fluid in the abdomen containing blood cells. To me blood cells in an aspirated fluid mean cancer. I do not think there is any logical reason to question that statement. I do not think that red cells would be found in a tuberculous exudate and I am sure they would not be found in a transudate resulting from disease of the heart or kidneys. Therefore, we will say that the underlying disease is cancer and, although it first appeared in the chest, it is logical to assume that it originated in the abdomen; that is, although her symptoms first occurred as a result of fluid in the chest, this cancer arose in the abdomen. What kinds of cancer in a female cause fluid, ascites, and may metastasize to the chest? First, carcinoma of the ovary. Nineteen times out of twenty it would be carcinoma of the ovary that would cause the picture which we are studying here. Once in a great while cancer originating in some other organ will result in a general carcinomatosis and ascites and in the past few years I have seen a substantial number of such cases in which even with a large incision in the abdomen, where one could both see and feel, it has been entirely impossible to determine where the growth had its origin. The last case of that nature which I saw a short while ago was in a young man. Unfortunately we could not get a postmortem but he had a picture just like this. Had it been a woman I certainly would have said carcinoma of the ovary. In this case the pelvic examination notes that the uterus is slightly enlarged, hard and retroverted; but I am inclined to disregard that because I believe she had a carcinoma of the ovary and for one reason or another it might not have been clearly felt at that examination. Therefore, I shall say, and I hope I am not falling into a pit, that she had primary papillary adenocarcinoma of the ovary with general carcinomatosis, metastases in the liver, which I neglected to mention, and metastases in the right pleural cavity.

X-ray Interpretation

Dr. George W. Holmes: The films in this case present the characteristic picture of a large amount of fluid in the right pleural space. The heart is displaced and the lung markings have disappeared. After tapping we see the pleural space filled with air. If this patient had extensive metastases to the lung sufficient to produce a bloody pleurisy it is rather strange that the whole lung should have collapsed down to a mass no larger than is seen here and that there are no nodules visible in the parietal pleura. In other words, this looks now like an ordinary pneumothorax with fluid. I think that it is not impossible that this patient has metastases to the lungs but I certainly wonder if the fluid did not come from below the diaphragm rather than from some process in the chest.

Dr. Miller: What do you mean by that?

Dr. Holmes: That something ruptured through from the liver into the chest and in that way collapsed the lung. The heart shadow is not enlarged. We have no reason to suspect trouble with the vascular system. The gastrointestinal examination was said to be negative and I shall not attempt from this plate to dispute it. There is rather more than normal density in the pelvis. There may be, as Dr. Miller has said, tumor in the pelvis, but we have no positive proof.

Clinical Discussion

Dr. John W. Cass: We were very much puzzled by this syndrome and felt that we had ruled out most of the common things that might give this picture. We thought we had ruled out tuberculosis. On questioning the patient it seemed

that there was little good evidence that she had really had it nine years before. She had a good deal of diarrhea at the time, had been overworking, lost a little weight and had a little blood in the mouth but no real hemoptysis. We ruled out any heart condition or kidney condition or Pick's syndrome which might have given this picture and because of the definite finding of tumor in the pelvis we felt that, since the patient was sent to this hospital for definite diagnosis and since she was in good condition, and understood the whole situation, and was willing to go through operation to determine the diagnosis, it was logical to put her through it. The diagnosis was malignancy of the ovary with metastases probably throughout the peritoneum and to the chest, although we thought that it was unusual to get complete absence of cancer cells in the fluid and to get this x-ray picture.

DR. LELAND S. MCKITTRICK: As Dr. Cass said, our preoperative impression was pretty much as Dr. Miller had made it. We had not yet been able to make a positive diagnosis and, as has been pointed out, the findings were not entirely characteristic of malignancy. Pelvic examination was not altogether satisfactory. She had a hard, fixed uterus, a firm mass in the pelvis, the outlines of which I could not make out. Exploration was done, hoping to make a positive diagnosis, but without the slightest expectation that we were going to do her any good. The abdomen was opened and it was filled with straw-colored fluid then as in the taps. In the pelvis was a perfectly typical benign fibroma of the ovary. It was wedged in the pelvis but could be brought out easily. There were two or three small grayish areas on the peritoneum which looked almost like areas of pressure necrosis although they did not extend very deeply. The tumor was taken out but even then I had not the slightest idea that it was going to do any good. It is not too uncommon to find ascites with a benign tumor of the ovary but I cannot associate it with the fluid in the chest. Dr. Cass was deserving of no little credit in insisting upon removing the tumor, and it seemed satisfactory to take it out.

DR. TRACY B. MALLORY: Dr. Cass, will you tell us the outcome?

DR. CASS: This patient made an uneventful recovery and left the hospital about three weeks after the operation. She had been tapped previous to the operation, both her abdomen and chest, and there had been at the time of discharge no evidence of any reaccumulation of fluid. Without any specific therapy she had gained ten pounds in weight and had returned to her normal health. She has been followed since and a letter just recently received from her states that she is in the best of health, has gained twenty-five pounds and has been working for six months at her occupation as a secretary.

There is only one other thing that Dr. McKittrick did not mention. The liver was very large, though otherwise perfectly normal as far as palpation could determine it, and the liver has decreased in size under the observation of the local doctor but can still be palpated. Dr. Meigs will probably say that this syndrome is not uncommon. There have been cases reported similar to this, three by Dr. Meigs in his book and one case that I found in the review of the literature in the last fifteen years of a case identical with this with complete recovery; so that in some way this tumor did cause this picture.

DR. MALLORY: As Dr. Miller suggested, I did lay a trap for him. I did not believe anyone would possibly come to any diagnosis in this case other than that of generalized malignancy and yet it would have been very easy to think that there was no use whatever in exploring such an evident and hopeless case. But the woman has completely recovered. Histologic examination of the tumor gave us no additional information. It was a perfectly typical benign fibroma of the ovary. This is by no means the first case of this type that we have found in this hospital.

DR. JOE V. MEIGS: I remember when I was with Dr. Graves at the Free Hospital that he said that a tumor in the pelvis with fluid in the abdomen was not necessarily a hopeless proposition. There are cases of fibroma of the ovary that are accompanied by a great deal of fluid that recover completely after removal of the tumor. I have seen quite a number and about thirty per cent have ascites. In going over the histories and pathological specimens of fibromas of the ovary three years ago I discovered three patients who had been studied on the medical wards and suspected of tuberculosis. They had pleurisy with effusion and were tapped two to six times each. Eventually a fibroma of the ovary was discovered and on removal of the tumor the ascites which they had and the pleural effusion cleared up. These three cases made me suspect that there ought to be a syndrome with ascites, pleural effusion and fibroma of the ovary. Dr. Cass's case is very similar to the other three, and two of our cases followed for five years are free of any difficulty since their operations.

DR. AUBREY O. HAMPTON: Dr. Daniel Jones had a presumably benign tumor of the pancreas, a cyst, which was accompanied by pleurisy, and the fluid disappeared after exploration.

PREOPERATIVE DIAGNOSES

Tumor of the ovary, ? malignant.
Ascites, undetermined origin.
Gall stones.

DR. RICHARD H. MILLER'S DIAGNOSIS

Papillary adenocarcinoma of the ovary with peritoneal metastases.

PATHOLOGIC DIAGNOSIS

Fibroma of the ovary.

CASE 21412

Presentation of Case

An eleven year old Italian boy was perfectly well until three or four weeks before admission, when he seemed to lose his pep and appetite and preferred to stay indoors rather than play outside.

Three weeks before admission his face became swollen, at first over the eyes and later over other parts of the face. This swelling was symmetrical and more marked some days than others. His ears were swollen and appeared quite pink. He developed a dry, hacking, intermittent cough. One week before entry the swelling spread to his neck. He developed shortness of breath at night which became so severe that he was forced to sit upright in bed. The cough continued but was not a prominent symptom. On the day before admission he felt quite well and the appearance of his face was considered better. On the morning of admission, while getting dressed, he suddenly called to his mother that he was choking, that he could not get his breath and that he was "dying". He became blue and was immediately rushed to the hospital. He arrived at the emergency ward less than three-quarters of an hour after the onset of the acute distress; he was practically unable to breathe, extremely cyanotic and unconscious. A tracheotomy was performed immediately under great difficulty; a large amount of edema fluid and blood spilled into the wound. He was relieved somewhat by the operation and was then placed in an oxygen tent where his color improved although he still remained slightly cyanotic.

Physical examination was made with the boy in the oxygen tent; he was well-developed and nourished, and rather large. The tracheotomy tube was in place. He was having moderate respiratory distress, partly from phlegm which could be sucked from the tracheotomy tube and partly from an obstruction below the tube. The head was normal in size and shape. There was some edema about the loose tissues of the face and eyelids. The conjunctivae were slightly injected. The tongue was coated and edematous. The pharynx was injected and very boggy. There was marked pitting edema about the neck, giving a "bull-neck" appearance. No glands could be felt. There was moderate pitting edema over the chest wall and a number of rather large superficial veins running in a cirsoid manner over the anterior wall. The suprasternal dullness measured 5 centimeters. The percussion note over the lungs showed hyperresonance. There were numerous fine crackling râles at the bases of both lungs. But little air was heard to be entering the lungs on auscultation. The heart seemed to be functioning quite well. Abdominal examination was negative. The liver edge could be felt at the costal margin. There were no enlarged glands in the axillae or groins.

The temperature was 99°, the pulse 95. The respirations were 24.

Examination of the blood showed a red cell count of 4,370,000, with a hemoglobin of 66 per cent. The white cell count was 13,600, 48 per cent polymorphonuclears.

X-ray examination of the chest showed a large mass which lay in the midline but extended slightly more to the right than to the left. Its center appeared to lie just below the bifurcation of the trachea. The edges of the mass were smooth and rounded.

He was kept in an oxygen tent and appeared somewhat more comfortable in the latter part of the afternoon. Toward evening, however, he became much more dyspneic and died soon after midnight.

Differential Diagnosis

Dr. F. Dennette Adams: "Barring some type of skin inflammation, there are several causes of edema of the face in a child of this age, the most common being nephritis, trichinosis, and obstruction to the return flow of blood or lymph. Trichinosis should always be considered where there is subcutaneous swelling. This is a common early sign of the disease and frequently causes it to be mistaken for nephritis. However, the edema does not customarily involve the neck and ears, nor vary in intensity from day to day. In this boy none of the other usual features of trichinosis are present, and the same holds true for nephritis. In the latter, edema of this extent would not be limited to the face, and the other symptoms described certainly are not to be associated with this disease. The cyanosis, orthopnea, and rapidly increasing dyspnea point directly toward tracheal, bronchial, or circulatory obstruction, or more than one of these. There is nothing to suggest laryngeal diphtheria or other type of inflammation within the respiratory tract; nor is the picture characteristic of circulatory embarrassment primarily, such as might be caused by congenital malformation of the heart, severe valvular disease, pericarditis, or an increase of the back pressure from coarctation of the aorta. By the process of exclusion, on the basis of history alone, one is forced to the conclusion that we are dealing with respiratory obstruction, due probably to pressure of a mass within the mediastinum. This would best explain the severe combined respiratory and circulatory block and the failure of greater relief to be obtained by tracheotomy.

Assuming the presence of an obstructive mass, the field of choice is limited to abscess or tumor. There have been no symptoms in the past to make one suspicious of infection, and since tumor is so much more common this would seem to be the probable diagnosis. There is noth-

ing in the history which could not be explained by tumor. In the mediastinum neoplasm could grow readily without making itself manifest until sufficiently large to interfere with circulation or respiration; the rapid increase of dyspnea and cyanosis could be due to sudden enlargement by hemorrhage or edema or to shift in location with change of the patient's position.

Physical examination, showing edema, dilated veins on the chest, and interference with flow of air in and out of the lungs, presents definite confirmatory evidence. The supracardiac dullness was wide and percussion would have doubtless shown it even wider had the lungs not been overinflated.

The x-ray findings are also confirmatory.

In a case of mediastinal tumor at this age one naturally thinks first of thymoma, teratoma and Hodgkin's disease as the most likely possibilities. Later in life, substernal goiter, aneurysm, or some other type of malignant tumor would be suspected but they are hardly to be considered here. Between the two first mentioned I do not believe it possible to differentiate without pathological investigation. Hodgkin's disease should show glands elsewhere or at least have had them in the past. Furthermore, Hodgkin's is a more chronic disease and should show generalized constitutional symptoms. Acute leukemia with mediastinal glands would have an abnormal blood picture.

A PHYSICIAN: Could it be a tuberculous gland?

DR. ADAMS: It would have to be a tremendously large gland to give this picture.

A PHYSICIAN: If a case of thymoma is exposed to x-ray does it not have a tendency to diminish the mass?

DR. ADAMS: Yes. But he did not receive treatment; only a diagnostic plate, and probably a portable one. Whether x-ray treatment was not started immediately for fear of increasing the obstruction by reaction incident to therapeutic exposure, I do not know; but that is a possible explanation.

A PHYSICIAN: I have seen one case of thymoma which acted almost exactly like this. Decrease in the size of the tumor was brought about by the x-ray exposure in taking the diagnostic plate. The patient then received therapeutic doses and within a few days the mass had apparently completely disappeared. In a month's time, however, he began to have hemorrhages, and despite several transfusions died within two months.

CLINICAL DIAGNOSIS

Mediastinal tumor.

DR. F. DENNETTE ADAMS' DIAGNOSES

Mediastinal tumor—teratoma or thymoma.
? Bronchopneumonia, terminal.

ANATOMIC DIAGNOSES

Lymphoblastoma of the thymus (thymoma) with pulmonary infiltration.
Operative wound: Tracheotomy.
Hyperplasia of the spleen and mesenteric lymph nodes.
Endocarditis, acute rheumatic, mitral.
Pleuritis, chronic fibrous, bilateral.
Chloasma.

PATHOLOGIC DISCUSSION

DR. TRACY B. MALLORY: What we found was a very large tumor in the anterior mediastinum which occupied the position of and completely replaced the thymus. It was obviously malignant in character and was infiltrating in all directions laterally into the lungs, and anteriorly and posteriorly through the mediastinal tissues. It has not penetrated the pericardium as these tumors sometimes do.

The diagnosis of course narrows down to what types of tumors occur in this region. In an old person you have to think of various other things that do not come under consideration here; a substernal goiter, cancer of the thyroid or metastases from a distant spot and so on. These are all practically ruled out by the age factor alone. Generalized lymphoma must of course be ruled out. A dermoid cyst or a teratoma of the anterior mediastinum are perfectly good possibilities in a child and there is no way to differentiate them from thymoma. It comes down to the question of one or another of these three tumors and of them thymoma is distinctly the commonest. What these so-called thymomas are, we do not really know. The thymus, as you will remember, microscopically is made up of a small amount of epithelium, ordinary squamous epithelium, and of a large amount of what looks like lymphoid tissue. In older people, from fifty up, a tumor of the thymus stands a very good chance of being a squamous cell carcinoma. But in children it practically never is cancer and will usually look like a more or less typical lymphosarcoma, as in the case here. These tumors are very sensitive to radiation and Dr. Holmes felt in this particular case if they had gone a little farther with the tracheotomy—if they had put a tube down into the bronchi to establish an airway—and then had given him a small dose of x-ray, it was perfectly possible that the patient could have been pulled through, coming in even moribund as he did.

DR. ADAMS: Was there no cyst, hemorrhage or edema to account for the sudden increase in symptoms?

DR. MALLORY: These tumors of course lie just beneath the upper thoracic outlet which is a fairly small and very inelastic space. It is bounded by the first rib and clavicles on the side and front and by the vertebral column be-

hind. A very slight shift of the tumor upward would wedge it into this outlet and make a tremendous difference in the amount of obstruction. Variations in position might easily account for such a shift. I suspect that when he was lying down he was much more obstructed than when he was upright.

The majority of these tumors look like and probably are lymphomas. Our diagnosis on this case was lymphosarcoma of the thymus. However, it must be admitted that a case of lymphoma which fails to become more or less generalized is open to suspicion as to the correctness of the diagnosis. Many of the cases starting in the thymus do not look or behave quite like lymphoma and there always has been a question whether all the round cells in the normal thymus are lymphocytes or not. They look so much like them that so far the histologist has not been able to differentiate them with any certainty.

A PHYSICIAN: In this particular case if he had got exposure to x-ray you think he would have pulled through this attack?

DR. MALLORY: One can only guess at it. If you could have got in one small dose of radiation without his suffocating he would have pulled through. The whole question would have been whether you could have kept the airways open long enough. There is real danger of significant swelling of the tumor for a few hours after the x-ray treatment which might prove suddenly fatal.

A PHYSICIAN: What factor did the vagus have here? Was it entirely mechanical obstruction or was there some interference with the vagus?

DR. MALLORY: My impression was that it was entirely mechanical. The phrenic lay closer to the tumor than the vagus but it obviously was not involved, since the diaphragm moved satisfactorily. The vagus was far enough back so that it could hardly have been affected.

A PHYSICIAN: The question could be raised, inasmuch as you have this large mass here, whether the obstruction would develop so suddenly since it was mechanical.

DR. MALLORY: I think it is again the question of a tumor mass filling the neck, and the difference of an eighth of an inch in diameter of the tumor would make the difference as to whether the neck was completely plugged or partially plugged.

A PHYSICIAN: Did he have the general appearance of a status lymphaticus individual?

DR. MALLORY: No; and the lymph nodes elsewhere were not enlarged.

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GRADUATE TEACHING

THE problem of graduate teaching is becoming more and more acute. For many years several medical schools have attempted to meet the needs of those who have desired to improve their medical education. There are about twenty-eight medical schools in this country offering courses to graduates. The question is, "Are these schools to continue their programs indefinitely or will they endeavor to assume the real functions of medical education in its broadest sense, beginning at the point when the student receives his diploma?"

In the main the support of the so-called Post-Graduate School is derived from the tuition of its students, which makes the institution a commercial one. The result of this is that the burden on the individual student seems large to him and the remuneration seems small to the teacher.

Graduate teaching today is carried on under the same conditions that prevailed in the undergraduate medical departments thirty-five years ago. No sane person wishes a return of those days. It would seem then, as a result of this unhealthy situation, that some sincere effort ought to be made to remove the graduate school from the arena of commercial medicine and put it in a more dignified place. Unfortunately, the public which needs the practitioner is unwilling to help the situation by endowing graduate schools. Funds for research are given much more freely than for improvement of the product of the medical schools. The busy practitioner is unwilling to leave his practice for several reasons: the fear of losing his practice while absent, the expense of maintaining his family and himself, the tuition, the leaving of his community without a physician and too frequently the fear of mixing with his city colleagues. He is afraid to ask questions and express his opinions and often there is lack of interest in self-improvement. All these facts are evident to those who have had contact with the problems of graduate teaching since less than four per cent of the practicing physicians of this country attend courses for graduates.

During the past few years Boards of Certification have been formed by several of the special societies which have laid down minimum requirements in order that a physician may be recognized as qualified to specialize. There is no regular organized scheme at present which will meet the needs of this situation.

A specialist, in addition to his clinical experience, should have a fundamental knowledge of general pathology followed by training in pathology applying to his special field. The graduate school is the legitimate medium for organizing and managing this work. These schools therefore should abandon the insignificant place which they now occupy and strike out on a large, well-formulated basis to care for the practitioner, the research fellow, the intern and the embryo specialist.

Such departments as are needed may be had from expansion of the undergraduate departments. This is probably advisable as the contact may stimulate the undergraduate to continue his studies as long as he is active. In order for graduate departments of medicine to assume the functions which properly belong to its life and welfare, it is necessary to have the whole matter of graduate teaching thoroughly studied and investigated by some well-qualified person or persons who will report their findings and make recommendations. The time is ripe for such a procedure. The school, the physician and above all the patient will reap the benefit.

THE COMMONHEALTH

The Commonhealth, the quarterly journal of the Massachusetts Department of Public Health, lives up, in its current issue, to a high standard originally set and consistently maintained. For Number 2 of Volume 22 the editor has selected the general subject of personal hygiene, and as usual has presented an array of authorities who have written on many phases of this interesting and important subject.

Hygiene is today as much concerned with mental comfort, happiness and efficiency as it is with physical well-being, and it is fitting that the leading article, by Dr. Ives Hendricks, should be on Clinical Psychology and Medicine, containing a brief résumé of the advances that have been made in our understanding and handling of the neuroses. Other contributions have to do with conservation of sight and proper lighting; the prevention of deafness; the care of the teeth, feet and skin; ventilation, air conditioning and heating; the preservation of foods; the preparation of meals; scientific facts about sleep, and recreation, hobbies and dress.

A good work is being done in the preparation of these bulletins, and the layman who follows through with them will receive a sound education in those fundamentals of medicine, hygiene and public health which should be the property of all intelligent citizens. One wonders how many are aware of its existence and that it will be sent free to any citizen of the state who applies for it.

The list of contributors is necessarily great and it is not to be expected that all will write with an equal degree of interest and clarity. The facts presented, however, are all sound and should be valuable.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

DAVIS, CARL H. B.A., B.Sc., M.D. Rush Medical College 1909. F.A.C.S. Clinical Professor and Director of Department, Obstetrics and Gynecology, Marquette University School of Medicine. Obstetrician and Gynecologist, Columbia and Milwaukee County Hospitals. His subject is "Lesions of the Cervix Uteri—Diagnosis and Treatment." Page 699. Address: 425 E. Wisconsin Avenue, Milwaukee, Wisconsin.

MONGAN, CHARLES E. A.B., M.A., M.D. Harvard University Medical School 1892. F.A.C.S. Visiting Surgeon, Holy Ghost Hospital for Incurables and Somerville Hospital, Senior Staff. His subject is "Changes in Maternal Mortality and Their Significance." Page 705. Address: 24 Central Street, Somerville.

PEMBERTON, FRANK A. S.B., M.D. Harvard University Medical School 1909. F.A.C.S. Surgeon-in-Chief, Free Hospital for Women, Brookline. Clinical Professor of Gynecology, Harvard University Medical School. His subject is "Resection of the Presacral Nerve in Gynaecology." Page 710. Address: 198 Commonwealth Avenue, Boston.

ZOLLINGER, ROBERT. B.S., M.D. Ohio State University College of Medicine 1927. F.A.C.S. Instructor in Surgery, Harvard University Medical School. Junior Associate in Surgery, Peter Bent Brigham Hospital. Address: Peter Bent Brigham Hospital, Boston. Associated with him is

YOUNG, EDMUND. A.B., M.D. Harvard University Medical School 1934. Intern, Surgery, Lakeside Hospital, Cleveland, Ohio. Address: Lakeside Hospital, Cleveland, Ohio. Their subject is "Observations on the Symptomatology of Cholelithiasis With Special Reference to Vomiting." Page 714.

AYERS, CHARLES E. M.D. Tufts College Medical School 1912. F.A.C.S. Orthopedic Surgeon, Memorial Hospital, Worcester. His subject is "Further Case Studies of Lumbosacral Pathology with Consideration of the Involvement of the Intervertebral Discs and the Articular Facets." Page 716. Address: 36 Pleasant Street, Worcester.

HURWITZ, ALFRED. M.D. Johns Hopkins Medical School 1933. Intern, Boston Lying-In Hospital. His subject is "Trichobezoar." Page 721. Address: Boston Lying-In Hospital, 221 Longwood Avenue, Boston, Massachusetts.

The Massachusetts Medical Society

SECTION OF OBSTETRICS AND GYNECOLOGY*

C. J. KICKHAM, M.D., *Chairman*, 524 Commonwealth Ave., Boston, Mass.
R. S. TITUS, M.D., *Secretary*, 472 Commonwealth Ave., Boston, Mass.

DIAGNOSIS AND TREATMENT OF BENIGN ENDOMETRIOMATA OF THE OVARY

(Chocolate Cysts, Endometrial Cysts of the Ovary)

Perforating hemorrhagic or chocolate cysts of the ovaries are usually found in women between thirty and fifty years of age, are frequently bilateral with accompanying secondary implants to uterus, tubes, round ligaments, large and small intestine, bladder, and pelvic peritoneum, but unlike malignant ovarian tumors, rarely, if ever, found in the omentum.

*A series of short selected articles by members of the Section will be published weekly.
Comments and questions by subscribers are solicited and will be discussed by members of the Section.

The preoperative diagnosis is difficult. In large endometrial cysts of the ovary there is often a history of sterility and severe acquired dysmenorrhea with acute attacks of pelvic pain, occasionally rectal and vesical tenesmus. The condition is often associated with fibroids and other pelvic disorders making the diagnosis uncertain. With such a history and a pelvic examination that reveals a conglomerate tumor, a fixed uterus with inflammatory-like masses in the region of the adnexa and a nodular infiltration or scar like formation in the culdesac the indications point strongly to hemorrhagic ovarian cysts.

At operation one or both ovaries will be found to be enlarged and cysts containing a typical dark, syrupy material, with dense adhesions involving adjacent structures making removal extremely difficult.

Treatment: The differential diagnosis presenting a difficult problem, especially excluding pelvic inflammation and knowing there are adhesions and fixation of the organs, relief is best effected by mechanical procedures. Surgical intervention is indicated when the patient is considered a reasonably good surgical risk rather than treating with x-ray or radium. It is recognized that the growth of the implants are dependent on the functional activities of the ovaries, therefore all ovarian tissue should be removed. Secondary implants should be removed when easily possible. When implants are extensive and difficult to remove, such as those found on the intestine and bladder, an attempt at removal should not be undertaken as these lesions in a majority of cases will atrophy and be followed by relief of resulting symptoms when the ovarian tissue has been completely removed. If there is activity after operation or the patient is an extremely poor surgical risk, irradiation may be employed in an attempt to inactivate the ovarian function.

THE 1936 ANNUAL MEETING

At the Council Meeting, October 2, the Committee of Arrangements reported that the next Annual Meeting of the Massachusetts Medical Society will be held on June 8, 9, and 10, 1936, at the Hotel Kimball, Springfield.

PUBLIC RELATIONS COMMITTEE

Compulsory Sickness Insurance not the Answer

Compulsory sickness insurance is a system of insurance, administered either by the Government or by some type of commercial insurance organization, to which certain designated groups in a community are compelled by law or as a condition of employment to subscribe. These designated groups are determined on the basis of certain income levels. These income levels have been placed by various proponents at different amounts. The general idea however being that it shall not exceed an amount necessary to supply the essential comforts of life.

In the feudal state the overlord was charged with the care of his dependents. In the trades, the guilds assumed the responsibility; but with the great and unrestricted and rapid growth of industrialism, with its machines and impersonalities, with its alternating surplus and shortage, with its failure ofttimes to share profits equitably with the worker, all this was changed and there developed a type in our population which was not able to care for even its basic needs and for which nobody seemed responsible.

This failure on the part of our industrial system to provide sufficient wealth for every willing worker to care comfortably and completely for himself and his family in their essential needs brought into being the social concept, which is in effect, that because the public tolerated an abuse, it was bound to do what it could to relieve the abused.

While some attempts have been made to correct the abuses of industrialism, we had rather come to think of them as inevitable, as something inherent in the system, as something that could not be changed without wrecking the whole. We rather think this problem has grown to such vast proportions before we even recognized we had a problem that its magnitude appeared too formidable for us and we turned to the easier way of making it up to industry's abused by means of charitable and social agencies. In the presence of a malignant disease that might have been cured by early operation we threw away the scalpel and administered a shot of dope.

Doctors know of these charitable and social agencies as no other group does. They have been caring for industry's oppressed in their charitable clinics within and without hospitals for many years. They have seen these clinics grow to enormous magnitude, representing services which if paid for would amount to more than $100,000,000.00 each year. Social service was the doctor's handmaiden. The greatest impetus to its growth comes from doctors.

Is it any wonder then that doctors think that they are entitled to have something to say about the trends which these agencies are assuming? Nobody in the profession questions that grave abuses have been allowed to creep into free clinics. A friend of the writer giving his services to a large metropolitan hospital can find no place to park his car because the out-patients have preempted all the parking space. Nobody who watches the trends of the last few years has any doubt but that the professional sociologist seeks the domination of medical practice.

The original concept of compulsory sickness insurance was designed to so spread the cost of sickness for those of small means over such large numbers as to make it unburdensome for each. Nobody questions the wisdom of this as a statement of an ideal. It would be most difficult to find any doctor who was not in entire sympathy with such a proposal. Thinking men however are wont to distinguish between a stated ideal and the application of that ideal to everyday life.

Compulsory sickness insurance has been offered as the instrument by which that ideal is to be realized. Let us see how well this system has maintained that ideal in the several countries in which it is already in operation. In every country in which has been inaugurated a system of compulsory sickness insurance the original concept of providing *first-class medical care* for those economically unable to provide it for themselves has been lost sight of and there has taken place either an extension of, or a tendency to extend the benefits to increasing num-

bers of the population irrespective of their abilities to provide for themselves. The figures to support this statement are available to anyone who cares to investigate. We find that this system of sickness insurance has so grown in the numbers covered that today it covers 63 per cent of the German, 76 per cent of the Austrian, 75 per cent of the Belgian, 65 per cent of the Danish, 31 per cent of the English, 61 per cent of the Swedish and 75 per cent of the Czechoslovakian populations. During the present year, 1935, there has been much agitation to very materially increase England's figures.

It is rather interesting to inquire as to why this ideal has not worked according to its original conception. We think the answer is to be found in the character of the institution that first offered it and has since controlled it, an institution that appears to be the same the world over, the institution of politics. Every one knows that there are very few ideals which politics touches that it does not ultimately blast.

The voice of the people has never been in demand for compulsory sickness insurance. Because labor has never been very much interested in the social concept, because it has never been interested in trading a steady job at a living wage for a bowl of soup, because it has never been interested in substituting social responsibility for personal responsibility, it has never been interested in compulsory sickness insurance. Furthermore, labor should never be deceived by the promises which such a system offers. Labor should know that as the ultimate consumer it pays, not part of the bill, but the whole bill. Labor should know that the employee's share is not a gift but something either taken out of wages or tacked on to the cost of the article produced which in turn labor must buy. Labor should know that it pays for the host of administrators, for the ornate and costly administrative buildings and equipment. It pays a bill far in excess of that which it paid when it received its medical care from private sources. (See "Handbook of Sickness Insurance and State Medicine and the Cost of Medical Care." Page 20.)

In 1881 Bismarck was in the process of realizing his crowning political effort—the unification of a strong German Empire. There was however a body of German citizens who, feeling oppressed by the industrialism of the time, were more interested in bettering their economic position than in Bismarck's dream. These Social Democrats, as they were called, had grown to such numerical strength by 1883 that they seriously threatened the policies of the crown. To attract votes from this group, to show the benevolence of the crown Bismarck had passed the first formal compulsory sickness insurance act. Gottlieb Pick, a German, writing in the "Sozialversicherung und Aerzte" 1931, page 56, has in this connection the following to say: "Bismarck's original plan arose out of a combination of the capitalistic with the feudal and fraternal mental attitude. Governmental care was to make clear to the eyes of the worker how much the state cared for them and thereby make them contented and loyal."

This German system has now been in operation more than fifty years. It has been and is changing with great rapidity due to the constant dissatisfaction with the details of the law. This constant alteration has brought about a most complex situation; so that today there are 3,000 sections of the German laws on compulsory sickness insurance. What a paradise for the bureaucrats!

The demoralizing effect which this system has had on the German citizen has been well put by a German physician, M. Kirschner, who writing in "Zur-Praxis der Begulachtung" has the following to say: "The insured also believe since they have long contributed to the cost of insurance, that after a certain time they have the right to receive some money from it. It is easy to implant the idea in the consciousness of a simple man: 'Now that I have paid so long, I will at last get something out of my insurance.' In this way the ominous will to be sick is artificially created and social institutions are many times practically compelled to put a premium on sickness, laziness, exaggeration and deceit, so that the individual who is in a manner the innocent victim of these compulsory institutions, cannot make any special individual objection. Since legal compulsion has today brought the majority of the population within the scope of social insurance, a constantly increasing proportion of the workers is being brought into a condition of subjection to these institutions."

Present-day Germany has been compared to a great lazaret or home for crippled where each individual is trying to get as much as possible out of the gigantic pension cup, which is kept filled by ever-increasing contributions. Every seventh German is today a "social pensioner". In this same connection let us listen to what Gustav Hartz, a German labor leader and economist, also has to say, writing in the *New York State Journal of Medicine*, March, 1935. "The sickness insurance provides the workman with medical attendance free of charge, with medicine and other necessities and with an allowance. Any one will at first sight consider this a great blessing for the workman as well as for national health. The reality, however, is very different. Dread of illness obsesses most people and this has been pressed into a system 'illness made easy' by which the will to be well has been strangulated. The doctor is consulted a dozen times where once would be sufficient—the insurance pays. The prescribing of medicine, bandages, etc., is desired. When they are obtained they lie about until they are no longer fit to be used and must be thrown away—the insurance pays. Besides it is nice to get something in return for the premiums paid year in and year out. Excessive over doctoring is the result. Pretenders and hypochondriacs are bred and the use of medicine becomes excessive. A few years ago it was estimated that four times as much money was used for doctors' fees and medicines for 35,000,000 of people in insurance as for 30,000,000 of uninsured. At first sight is seems improbable and paradoxical that a desire to obtain sick money that scarcely amounts to half the sum of wages should arise. It appears impossible that some one should, unless compelled by illness, forfeit his wages to get an allowance of half the amount. In millions of cases, for example, when wages are being decreased, when work is scarce and work hours shortened in consequence, when there are fewer shifts, many holidays, work restrictions in certain seasons, outdoor work in frosty weather, 50 per cent of the wages are welcome. One objects to the work he is given, another does not feel like working, a third's time is taken up by some family matter for which he would have to take leave of absence and forfeit his pay. In such cases sickness insurance comes in handy. Doctors are induced to prescribe medicine and instead of medicine toilet soap and scent are handed out by the pharmacies." How is this possible, you ask? Hartz answers that by saying that "under compulsory sickness insurance medical science has become a cheap article and doctors have given up conscientious treatment." This is not a very beautiful picture which Hartz paints. It strips human nature pretty bare. But it is in accord with a fairly generally accepted view.

Gottlieb Pick writing in Sozialversicherung und Aerzte 1932, page 40, tells us of the enormous administrative bureaucracy which has been built up in Germany by its compulsory sickness insurance sys-

tem. It tells us that the numbers of the Krankanhassen, the administrative side of the system, has grown to be practically the same as the number of physicians engaged in giving médical service.

None of these systems are self-supporting. They all depend on governmental subsidy with the inevitable increase in taxation. No reserves are built up by such systems of insurance. Birth, old age and death permit of fairly accurate determinations but there are so many moral elements which enter into this business of compulsory sickness insurance as to preclude the possibility of sound actuarial guidance. It is a hand-to-mouth existence which such systems must lead. In times of unemployment their costs must increase and the awards must decrease. They cannot pay out what they do not take in. This breeds trouble with the worker who believes because he has for years paid into such insurance he is entitled to a definite, fixed award in his time of need. The only other alternative is to dip deeper and deeper into the public treasury. It is held by many insurance experts that it is not insurance at all because it does not take into consideration the more or less fixed elements on which insurance is founded.

In 1911 David Lloyd George was having some trouble in England in maintaining his control of the British Government. There was an election in the offing. He was being pressed on the one hand by the Conservative and on the other by the Labor Party, and it looked as if the pressure exerted by these two forces might squeeze him and his Liberal Party out of the political picture. He felt that this would be a catastrophe for England and must not be allowed to happen, and so his waking hours were entirely taken up in formulating plans and furthering schemes for saving England and David Lloyd George. Then one night he sat up late reading German History, as a relaxation from the arduous labors of the day. He learned of a German statesman who several years before finding himself in much the same position hit upon the expedient of compulsory sickness insurance as a means of demonstrating his interest in and sympathy for the laboring man. He closed the book and went to bed. The German history had solved his problem and thus was born England's compulsory sickness insurance idea.

This English plan demands our closest scrutiny. Because it, more than any other, is being talked of as the model for the proposed American system.

It might be well at this point and for the moment to address ourselves to those few doctors who while not necessarily favoring, do assume a fatalistic attitude toward this matter of compulsory sickness insurance. "It is coming anyway. No matter what we do about it. So why bother to try to do anything." The Massachusetts Medical Society decries this attitude and the Public Relations Committee wishes to call to the attention of those this fact, that whatever merit there may be in the English system was had only because of the vigorous stand which the British Medical Association assumed in opposition to the iniquitous plan as originally proposed by David Lloyd George.

Under the English system all workers with a few exceptions who earn 250 pounds or less each year are compelled to subscribe. The worker has removed from his wages 9 pence each week. The employer adds 9 pence more and in addition the Government contributes an amount which when taken with that obtained from the other two sources will keep the system going. This latter amount during the last year was 19 per cent of the total cost. The worker alone is insured. His dependents are not. For his or her contribution the worker receives medical services, treatment and all those medicines and other therapeutic aids which the doctor deems necessary. When his or her illness is of such character as to unfit either for work and he or she is so certified by the doctor he or she receives certain cash benefits. When a worker's wife has a baby he receives a pound and when the wife herself is also a worker two pounds are added to the family budget.

The act provides for the services of the general practitioner only. It does not provide for hospitalization or the services of specialists. Any doctor licensed to practice medicine in England is eligible to do this kind of work. It is only necessary for him to indicate his desire to the Ministry of Health and his name will be placed on the panel which hangs in the local post office. The worker makes his selection from this panel. Once the worker has selected his doctor and has consulted him he must remain the patient of that doctor for one year, unless the doctor is willing to give him up. In the case of dispute on this and other matters there is provided a tribunal which will hear the grievances and render a decision. In addition to treating the patient, in certain rural communities, where there are no pharmacies, the doctor must dispense medicines and for this latter he receives special remuneration. He must record his calls on special cards supplied by the insurance committee.

When the insured's incapacity to work is doubted the doctor must supply the regional officer with appropriate information in the form of a written report. He must at all times be ready to answer charges of negligence brought against him by insured patients.

The doctor's remuneration is about $2.25 per insured person per year. The average ratio of insured to insurance doctors at this time is 1000 to 1. If this work were evenly divided among these doctors, each doctor's top each year would be $2,250.00. Forty-nine per cent of the English doctors are engaged in this type of work. These doctors may also engage in private practice.

It is estimated that the expense of a panel practice is $1,100.00 per year. The figures released by the British Ministry of Health a few months ago give an average gross annual income to the panel doctor of $1,960.00—or a net annual income from this source of $860.00. It being axiomatic that one receives according as one pays at least it suggests itself that such service might possibly leave much to be desired. The fact is, it is cheap service and at best second-class service. This is true not only in England and Germany but in all countries harboring systems of compulsory sickness insurance and nobody seriously questions this fact.

The proponents of the English system point to what they are pleased to call its low administrative costs and they point with pride to the English Civil Service system as one of the main reasons for these low costs. Nobody questions the excellence of the English Civil Service. It is one of the finest in the world. The Royal Commission on National Health Insurance is however not particularly impressed that these costs are low, but think quite the contrary. Let us put it in their own words: "We should have expected that very large societies having at their disposal for purposes of administration of National Health Insurance, they call it Health Insurance in England, all the machinery of a huge business undertaking, would have been able to carry on their administration at an appreciably lower cost per head of membership. We are surprised to find that this is not the case." For the actual administrative costs however let us have a look at the figures supplied by the British Ministry of Health for the year 1934. During that year the cost was $23,820,000. For every dollar spent on the insured fifteen cents was spent

on administration. Quite a tidy sum to come out of the workers for the administration alone of a second-rate article. Imagine if you can what these costs would be in this country where we have to muddle along without the excellence of the English Civil Service and where we enjoy an administration which tosses billions around as if they were toy balloons.

The administration of the English system is quite complicated. At its top is the Ministry of Health. Certain approved Societies and Commercial Insurance Companies complete in a general way the administrative set-up. Theoretically the commercial companies do their work without profit, actually, costs are so manipulated that a very tidy profit is realized. Those of us who have had any contractual contacts are familiar with cost plus plans. We know how these costs may be and are juggled, and we furthermore know that from these same costs come plenty of gravy.

Does the English worker like the system? I think in a general way he does. To quote Sir Frederick Treves: "The English working class has a craving for bottles of medicine which is second to the craving for strong drink." This system permits him to indulge this fancy to his heart's content without reckoning on its purchase price. He enjoys running to the doctor with his trivial complaints, distracting the doctor's time and attention from those who really need them. What a paradise for the neurotic! Nor, we are told, is this controllable. Refusal to supply these bottles of medicine means lost patients, and patients' families and friends and lost patients mean lost income, and here we have at the very beginning an invitation to moral let down of which we will have more to say later.

Is the English worker's health better since the establishment of the insurance system? There is no evidence that it is and if we are to accept the figures of the British Ministry of Health for a six year period, 1921 to 1927, we are forced to one of two conclusions, either his health is very much worse or he has developed malingering to a fine art. These figures tell us that the morbidity rates as indicated by benefit claims had increased during that period 41 per cent for men, 60 per cent for unmarried women and 106 per cent for married women.

Has the system lessened the time lost to industry by reason of the worker's illness? There is no evidence that it has. On the contrary there is evidence that it has not. Previous to the existence of compulsory health insurance in England the English and American workman lost about the same number of days each year because of illness. Today the English workman loses ten days each year and the American 6.5 days for this reason.

How has compulsory health insurance affected mortality rates in England? There is no evidence that it has affected them favorably and in this connection it at least is interesting to note that during a period of twenty years ending 1933 the English mortality rates dropped less than 10 per cent, while during this same period these rates dropped 21 per cent in the United States.

In England under this system the interest has been focused on the care of those actually ill and the emphasis has been largely away from preventive medicine as we know it in this country.

What about the amounts expended for poor relief? Has it been lessened in England under compulsory health insurance? It was expected that it would. There is no evidence that it has and while the insurance is for the worker and the care of the indigent does not come within the scope of the insurance act, it was expected that the poor law agencies would be relieved of the care of that great horde of workers whose wages were so low that they could not pay for their own medical care. It has, however, not worked out that way. Dr. R. G. Leland writing in the *Bulletin of the American Medical Association*, October, 1934, says that "the expenditures for this purpose have increased continuously ever since insurance went into force, and within the last two years the most extensive measures in this direction ever proposed in England have been put into operation. Some of these are much the same as those proposed by the Royal Poor Law Commission in 1909 and then rejected in favor of insurance." The vast unemployment of the times may have something to do with this and undoubtedly has. This condition however does not constitute by any means the whole explanation. We know that during the first two years of insurance, Governmental and privately supported clinics were very materially decreased in attendance but since that time there has been a steady and rapid trek back to these charitable clinics so that today more people are being treated by these agencies than ever before and their rolls by no means are made up entirely of the indigent and unemployed but contain the names of vast numbers of workers who are already covered by insurance.

Webster defines morals as the science or doctrine of right conduct. While conduct may be related to point of view, among all peoples there are certain fundamentals upon which all are in accord. Honesty in thought and act is one of these. The invitation to dishonest practices upon the part of the doctor and worker is everywhere recognized as one of the great evils of compulsory sickness insurance not only in England but in every country in which such a system is in operation. When the insured resents the doctor's lack of coöperation in making it possible for him to draw an extra week's benefit, when work is slack or when he thinks he needs a vacation, he is apt on the first possible occasion to change his doctor. Pretty soon the word is passed around that Doctor So and So is very strict and pretty soon Doctor So and So finds he has no patients. Compulsory sickness insurance places the doctor on the spot.

It has been said that the English doctor likes compulsory sickness insurance. This may be true. It is easy to understand why it may be true. Before the advent of insurance in England a large amount of medical service was dispensed through the medium of clubs. So terrible was the competition that many doctors employed solicitors or runners who sought to sign up patients for them at two pennies a week. These were intolerable conditions from any standpoint. Any system which changed this must be an improvement, as anything worse is not conceivable. So when we are urged to accept compulsory sickness insurance because our English brother may like it let us remember these facts and the speciousness of such an argument will be apparent.

Doctors who have opposed compulsory sickness insurance for this country have been accused in the lay press of being reactionary and devoid of sympathy and understanding of the needs of many of their fellow citizens. This criticism, we believe, is not vicious, but is due to a failure on the part of editors to understand the doctor's point of view. For this the doctor himself is very largely to blame. We have built a high wall around our motives and aspirations. We know their purity. We know that the well-being of humanity as it touches the doctor, occupies first place in his heart and mind. Who else knows it? When an editor looking at an abstract ideal and finding it good criticizes the doctor who opposes the application of the ideal, too much fault should not be found with him, because the doctor is either

too inarticulate or too proud to explain the reason for his opposition.

In this campaign of public education let us tell the editor and the public at large that we even more than they are eager that *first class medical care* shall be the heritage of every resident of our country and that they may know that this is not high sounding clap-trap, let us point to the billions in service which the doctors of this country pass on yearly to their underprivileged fellow citizens. Let us tell those swivel chair, well-fed and well-paid sociological romancers who have never treated a patient, who busy themselves with their graphs, diagrams and mathematics, that we even more than they are concerned with the health of our fellow man. Let us remind our people that mass production methods will yield poor dividends in health. Let us remind our people of the necessarily intimate personal relationship of patient and doctor with the direct responsibility which one shares with the other. Let us ask him if he desires the politician messing around in that relationship. If compulsory sickness insurance has so completely failed to realize its objective in providing *first class medical care* in countries like Germany and England with their homogeneous populations what can be expected of it in a country like ours with its extremely heterogeneous make-up? How could our Federal Government formulate a compulsory sickness insurance law that would be workable in each of our forty-eight states? The problems of no two are alike. What might be good medicine in the Carolinas might very well be poison for Massachusetts. The citizens of the United States have not been cast in a common mold. Their private lives are built around the traditions of their origin and it may be a hundred years before, and maybe never will our citizenry think as a unit in matters that touch closely their homes and families.

Maybe we do need some change in Massachusetts in the way in which medical care is made available. Who knows? Certainly not the fellow who takes a hop skip and a run view of the whole country. Certainly not the Committee on the Costs of Medical Care, from whose majority report comes a great deal of the urge for compulsory sickness insurance. This committee in its survey did not touch Massachusetts at all. The fact is, nobody knows. The Massachusetts Medical Society intends to know and is in the process of knowing through the activities of the committee on the adequacy of medical care, a sub-committee of the public relations committee.

The Massachusetts Medical Society is committed to an honest and intelligent attempt to find the truth and furthermore pledged to sponsor remedies where needed. Can any editor or citizen question the logic of such a procedure? Tell them of our plans. We of the committee are sure that they will listen eagerly and respectfully and much good will have been done.

THIRD ANNUAL POSTGRADUATE MEDICAL EXTENSION COURSE

The following sessions have been arranged by the Committee for the week beginning October 13:

Barnstable

Sunday, October 13, at 4:00 P.M., at the Cape Cod Hospital, Hyannis. Subject: Cancer of Breast and Uterus; Sarcomas of Bone; Lymphoma and Leukemia. Their Early Diagnosis. Discussion of Life History of Cancer and Grades of Malignancy. Instructors: C. C. Simmons, A. O. Hampton and C. L. Parsons. J. I. B. Vail, M.D., Chairman.

Bristol South (Fall River Section)

Monday, October 14, at 4:00 P.M., at the Stevens Clinic of the Union Hospital, Prospect Street, Fall River. Subject: Dermatology: Ten Common Skin Diseases — Diagnosis and Treatment. (1) Impetigo Contagiosa, (2) Scabies, (3) Acne Vulgaris, (4) Psoriasis and Seborrhoeic Dermatitis, (5) Epidermophytosis, (6) Herpes Simplex and Zoster, (7) Eczema, (8) Erythema Multiforme, (9) Verruca Vulgaris, (10) Dermatitis Medicamentosa and Dermatitis Venenata. Instructor: C. G. Lane. Eugene A. McCarthy, M.D., Sub-Chairman.

Essex North

Friday, October 18, at 4:00 P.M., at the Hotel Bartlett, 95 Main Street, Haverhill. Subject: Cancer of Breast and Uterus; Sarcomas of Bone; Lymphoma and Leukemia. Their Early Diagnosis. Discussion of Life History of Cancer and Grades of Malignancy. Instructors: G. A. Leland and Shields Warren. Francis W. Anthony, M.D., Chairman.

Essex South

Tuesday, October 15, at 4:00 P.M., in the Nurses' Home of the Salem Hospital, Salem. Subject: Arthritis. (a) Medical Care of Patient in the Home. (b) Orthopedic Treatment in Hospital and Aids in Home Treatment. Instructors: J. S. Barr and H. A. Nissen. Walter G. Phippen, M.D., Chairman.

Hampden

Thursday, October 17, at 4:00 P.M., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8:00 P.M., at the Holyoke City Hospital, Holyoke. Subject: Diseases of the Liver: Surgical Problems in Diagnosis of Acute Disease of Gall Bladder and Liver. Instructors: E. S. Emery and H. M. Clute. George L. Schadt, M.D., and George D. Henderson, M.D., Chairmen.

Hampshire

Wednesday, October 16, at 4:15 P.M., in the Nurses' Home of the Cooley Dickinson Hospital, Northampton. Subject: Arthritis. (a) Medical Care of Patient in the Home. (b) Orthopedic Treatment in Hospital and Aids in Home Treatment. Instructors: A. H. Brewster and A. A. Hornor. Robert B. Brigham, M.D., Chairman.

Middlesex East

Wednesday, October 16, at 4:00 P.M., at the Melrose Hospital, Melrose. Subject: Arthritis. (a) Medical Care of Patient in the Home. (b) Orthopedic Treatment in Hospital and Aids in Home Treatment. Instructors: R. B. Osgood and F. C. Hall. Joseph H. Fay, M.D., Chairman.

Middlesex South

Tuesday, October 15, at 4:15 P.M., at the Middlesex County Sanatorium, Waltham. Subject: Lung Diseases. (a) Differential Diagnosis and Treatment of Lobar Pneumonia. (b) The Surgical Problems of Empyema. Instructors: H. F. Newton and D. S. King. Edmund H. Robbins, M.D., Chairman.

Norfolk South

Monday, October 14, at 8:30 P.M., at the Quincy City Hospital, Quincy. Subject: Immunology: Latest Developments in Immunization. Smallpox, Typhoid, Measles, Scarlet Fever, Diphtheria, Whooping Cough and Infantile Paralysis. Instructor: G. W. Anderson. David L. Belding, M.D., Chairman.

Plymouth

Tuesday, October 15, at 4:00 P.M., at the Brockton Hospital, Brockton. Subject: Dermatology: Ten Common Skin Diseases—Diagnosis and Treatment. (1) Impetigo Contagiosa, (2) Scabies, (3) Acne Vulgaris, (4) Psoriasis and Seborrhoeic Dermatitis, (5) Epidermophytosis, (6) Herpes Simplex and Zoster, (7) Eczema, (8) Erythema Multiforme, (9) Verruca Vulgaris, (10) Dermatitis Medicamentosa and Dermatitis Venenata. Instructor: J. H. Swartz. Walter H. Pulsifer, M.D., Chairman.

Worcester North

Friday, October 18, at 4:30 P.M., at the Burbank Hospital, Fitchburg. Subject: Immunology: Latest Developments in Immunization. Smallpox, Typhoid, Measles, Scarlet Fever, Diphtheria, Whooping Cough and Infantile Paralysis. Instructor: E. S. A. Robinson. Edward A. Adams, M.D., Chairman.

MISCELLANY

HARVARD UNIVERSITY NEWS ITEMS

Four physicians from the Harvard Medical School and two physicians from the staff of the Massachusetts General Hospital have joined the Harvard Department of Hygiene as assistants to Dr. Arlie V. Bock, Henry K. Oliver Professor of Hygiene and director of the Medical Service at Harvard University. The appointments run for one year from September 1, 1935.

Of the new appointees, five will carry the title of Assistant Medical Adviser. They are Dr. Clark Wright Heath, Instructor in Medicine, Harvard Medical School; Dr. Greene Fitzhugh, formerly Assistant in Medicine, Harvard Medical School; Dr. Jackson Mash Thomas, Assistant in Psychiatry, Harvard Medical School; Dr. Kenneth James Tillotson, Instructor in Psychiatry, Harvard Medical School; Dr. Vernon Phillips Williams, Assistant Psychiatrist, Massachusetts General Hospital, S.B. Harvard '24, M.D. Harvard '28; and Dr. John William Cass, Jr., Assistant in Medicine, Massachusetts General Hospital, Ph.D. Boston College '25, M.D. Yale '29.

Dr. Seth Marshall Fitchet, Assistant in Orthopedic Surgery, Harvard Medical School, will be Assistant Surgical Adviser.

These appointments are in addition to those of five Assistant Medical Advisers and five Assistant Surgical Advisers in the Hygiene Department announced last spring.

Awards of forty-one scholarships totaling $10,095 to the following students in the Harvard Medical School this year were recently announced.

William McD. Hammon, 4M, of Pittsburgh, Pa.; Lewis Dexter, 4M, Beirut, Syria; James F. Whitten, 4M, of Amesbury, Mass.; Ferdinand F. McAllister, 2M, Brooklyn, N. Y.; Charles A. Robinson, 2M, Bronxville, N. Y.; William H. Sweet, 4M, Centralia, Wash.; Lewis Thomas, 3M, Flushing, N. Y.; James B. Blodgett, 4M, Detroit, Mich.; Arthur L. Abrams, 2M, Roxbury, Mass.; Walter H. Pritchard, 4M, Binghamton, N. Y.

Newell R. Kelley, 3M, of Hartford, Conn.; Lewis G. Shepler, 3M, Mystic, Conn.; Orvar Swenson, 3M, Independence, Mo.; Seth H. Read, 3M, Belfast, Me.; Robert D. Woolsey, 3M, Maquon, Ill.; Henry H. Work, Jr., 3M, Buffalo, N. Y.; Marshall deG. Ruffin, 4M, Roanoke, Va.; Henry B. Garrigues, 3M, Conshohocken, Pa.; Murray S. Howland, Jr., 3M, Binghamton, N. Y.; Richard B. Pippitt, 3M, Port Jervis, N. Y.; Vincent P. Gruzdis, 2M, Worcester, Mass.

Frank J. Lepreau, Jr., 2M, of Hastings-on-Hudson, N. Y.; Frederic D. Lake, 2M, Perth Amboy, N. J.; Joseph Foster Ross, 4M, Covina, Calif.; Robert B. Lawson, 4M, Foxborough, Mass.; Calvin T. Klopp, 2M, Reading, Pa.; George T. Howard, Jr., 3M, Lexington, Ky.; Ralph E. Durkee, Jr., 4M, West Hartford, Conn.; Espey F. Cannon, 4M, Salt Lake City, Utah; William H. Mathews, 4M, Whitesboro, N. Y.; David McL. Greeley, 3M, Madison, Wis.

Charles W. Hayden, 2M, Kansas City, Mo.; Elliott S. Hurwitt, 3M, Brookline, Mass.; Palmer Congdon, 4M, Waban, Mass.; Samuel T. Clarke, 4M, Honolulu, T. H.; Francis McC. Ingersoll, 2M, Tecumseh, Neb.; Donald E. Nitchman, 3M, Schenectady, N. Y.; Robert P. Tucker, 2M, Charleston, S. C.; John Maier, 2M, Royersford, Pa.; Robert S. Thomson, 2M, Milton, Mass.; and Charles E. MacMahon, 4M, Seattle, Washington.

ANTERIOR POLIOMYELITIS CASES FOR 1935

WEEKLY LIST, SEPTEMBER 30 - OCTOBER 5

City or Town	
Fall River	4
New Bedford	1
North Attleboro	2
Somerset	2
Ashland	1
Braintree	1
Brockton	1

Medfield	1
Natick	1
Quincy	3
Walpole	1
Arlington	2
Belmont	2
Boston	31
Cambridge	6
Malden	2
Medford	1
Newton	3
Revere	3
Somerville	4
Waltham	3
Watertown	1
Wellesley	1
Chelmsford	2
Lowell	4
Lynn	3
Methuen	1
Newbury	1
North Andover	1
North Reading	1
Wakefield	1
Leominster	1
Northbridge	1
Littleton	1
Holyoke	1
Longmeadow	1
Pelham	1
Southbridge	1
Greenfield	1
Total	99

RECENT DEATHS

FRIEDMAN—Nathan M. Friedman, M.D., of 1067 Blue Hill Avenue, Dorchester, Massachusetts, died at his home October 3, 1935.

He was born in 1884 and after graduating from a German Medical College subsequently graduated from the Tufts College Medical School in 1909.

He was a fellow of the Massachusetts Medical Society and the American Medical Association.

During the World War, he served as an examiner for the Medical Board. He was secretary of the Jewish Hospital for Chronic Diseases, Roxbury, and a Mason. Dr. Friedman is survived by his widow, Mrs. Isabel (Frank) Friedman, and two sons, Eliot Friedman and Theodore Friedman.

KLEIN—Alvin Walter Klein, M.D., of Stockbridge, Massachusetts, died September 27, 1935.

He was born in Owenton, Kentucky, February 2, 1868, educated in the public schools of Cincinnati and received his medical degree from the Cincinnati College of Medicine and Surgery in 1889. He practiced for a time in Cincinnati. After serving in the New York State Hospital Service and the U. S. Army Medical Corps, he became associated with the Austen Fox Riggs Foundation serving both as physician and trustee. He was a fellow of the Massachusetts Medical Society and the American Medical Association.

The only surviving relatives are nieces and nephews living in Sherbrooke, Canada, and New Rochelle, New York.

HICKSON—William James Hickson, M.D., of Pittsburgh, Pennsylvania, died at his summer home in Gloucester, Massachusetts, October 4, 1935.

He was a well-known psychologist with especial interest in criminology.

He had had a varied experience in criminal courts in Chicago and elsewhere.

Dr. Hickson was a graduate of Duquesne University and Pittsburgh University and received his medical degree from the University of Pennsylvania Medical School in 1900.

He was a member of the Illinois Medical Society, the American Medical Association, the Philadelphia Psychiatric and other scientific orders.

He is survived by his widow, Mrs. Marie Katherine Kittner Hickson.

WHEELER—Leonard Wheeler, M.D., of 12 Chestnut Street, Worcester, Mass., died at his home, October 2, 1935.

Dr. Wheeler was born in Lincoln, Massachusetts, August 31, 1845, the son of Abel and Charlotte (Bemis) Wheeler. His early education was acquired in the public schools of Lincoln. In 1862 he graduated from Phillips Exeter, and in 1866 from Harvard College. He received his M.D. degree from Harvard in 1870, after serving an internship at the Massachusetts General Hospital. He pursued postgraduate studies in Vienna and Breslau before settling in Worcester where he became prominent in hospital and consultation practice and was honored by the District and State Societies.

Dr. Wheeler is survived by his widow, Mrs. Elizabeth B. C. Wheeler; three sons, Dr. Bancroft C. Wheeler, Mr. Leonard Wheeler, Nathaniel Wheeler, and a daughter, Miss Eunice Wheeler.

NOTICES

MEDICAL CLINIC AND STAFF ROUNDS AT THE PETER BENT BRIGHAM HOSPITAL

At 3:30 P.M. on Thursday, October 17, in the amphitheater of the Peter Bent Brigham Hospital, Dr. Henry A. Christian, Physician-in-Chief, Hersey Professor of the Theory and Practice of Physic in the Harvard Medical School, will give a medical clinic. To it are cordially invited practitioners and medical students. These clinics will be repeated on Thursdays, October to May.

On Saturdays in the wards of the Peter Bent Brigham Hospital, from 10 to 12, staff rounds will be conducted by Dr. Christian.

REMOVALS

S. Seymour Horlick, M.D., announces the removal of his office from 1687 Commonwealth Avenue to 1860 Commonwealth Avenue, Brighton. Telephone: Longwood 5460.

William T. Hopkins, M.D., announces his removal from 7 Atlantic Street, Lynn, to 832 Humphrey Street, Swampscott, Massachusetts: Telephone: Jackson 0334.

BOSTON DISPENSARY

Assembly Hall, 25 Bennet Street

Medical Conference Programs

October, 1935, 9-10 A.M.

Friday, October 11 — Ward Cases. Dr. S. J. Thannhauser.

Monday, October 14 — Endocrine Clinic. Case Presentations. Dr. Charles Lawrence.

Tuesday, October 15—X-Ray Demonstration. Dr. Alice Ettinger.

Wednesday, October 16—Ward Cases. Dr. S. J. Thannhauser.

Thursday, October 17—"Vital Statistics and Medical Statistics." Dr. E. B. Wilson.

Friday, October 18 — Ward Cases. Dr. S. J. Thannhauser.

Saturday, October 19 — Tuberculosis Clinic. Dr. S. J. Thannhauser.

Monday, October 21—Anaphylaxis Clinic. Case Presentation. Dr. Joseph Kaplan.

Tuesday, October 22 — "The So-Called Splenic Anemias." Dr. William Dameshek.

Wednesday, October 23—Ward Cases. Dr. S. J. Thannhauser.

Thursday, October 24—"Physiological Significance of Macrocytosis in Anemia." Dr. W. B. Castle.

Friday, October 25 — Ward Cases. Dr. S. J. Thannhauser.

Saturday, October 26—Nephritis Clinic. Dr. S. J. Thannhauser.

Monday, October 28—G. I. Clinic. Case Presentation. Dr. K. S. Andrews.

Tuesday, October 29 — "Flat Feet." Dr. John D. Adams.

Wednesday, October 30 — Ward Cases. Dr. S. J. Thannhauser.

Thursday, October 31 — "Revision of Interpretation of Laboratory Tests for Syphilis." Dr. Hinton.

NEW YORK ACADEMY OF MEDICINE LECTURES

The New York Academy of Medicine has arranged for a series of lectures addressed to the lay public.

The opening lecture, October 4, by Dr. Walter B. Cannon of the Harvard Medical School was under the title of the "Wisdom of the Body." Seven lectures by outstanding authorities are to follow.

The subjects will deal with the "art and romance of medicine," the "methods of medicine", how "medicine achieved its goals", and "how it is striving for those unattained."

Disease and disease prevention will not be discussed.

BOSTON UNIVERSITY SCHOOL OF MEDICINE SURGICAL CLINIC AT THE BOSTON CITY HOSPITAL

Friday, October 11, 12—1, Cheever Amphitheatre. Dr. William R. Morrison, Associate Professor of Surgery, will present:

1. Posterior gastro-enterostomy for obstructing duodenal ulcer.
2. Two-stage Lahey operation for cancer of rectum.
3. Indirect inguinal hernia.

Physicians and medical students are invited.

MASSACHUSETTS MEMORIAL HOSPITALS

The Surgical Section will resume its monthly meetings on October 11, 1935. The meeting will be held in the Ladies Aid Room (former nurses dining room), Talbot Memorial, 82 East Concord Street, Boston, at 12 noon on the above date.

Dr. Frank E. Barton will speak of his "Observations in Hospitals in Europe" and papers will be presented by Dr. Samuel L. Marnoy, Dr. Leo J. Lynch and Dr. Phillips. L. Boyd.

Milo C. Green, *Secretary*.

DR. WILLIAM D. McFEE ELECTED SECRETARY OF THE NEW ENGLAND PHYSICAL THERAPY SOCIETY

At a Council Meeting of the New England Physical Therapy Society held at the Hotel Victoria on September 25, Dr. William D. McFee of Boston and Haverhill was elected Secretary of the organization to succeed the late Dr. Arthur H. Ring of Arlington who had been the Secretary since 1930.

REPORT AND NOTICES OF MEETINGS

THE ANNUAL MEETING OF THE NEW ENGLAND SURGICAL SOCIETY

For the second time in its history the New England Surgical Society was invited to hold its annual meeting in Manchester, New Hampshire, this year. September 27 and 28 were selected and the Local Committee, Dr. David W. Parker, Dr. George C. Wilkins and Dr. Ezra A. Jones, arranged and conducted a most admirable program. On Friday morning the local men operated at the Elliott Hospital and at ten o'clock the following dry clinic was conducted:

Dr. John P. Bowler, Compound Fractures.

Dr. Emery M. Fitch, Carcinoma of Penis.

Dr. George C. Wilkins, Cancer of Mouth.

Dr. Thomas W. Luce, Pick's Disease.

Dr. Ezra A. Jones, Leg Lengthening (Infantile). Fracture Neck of Femur, Sedimentation Test (Résumé).

Dr. David W. Parker, Prolapse of Rectum, Obstruction at Ligament of Treitz (Torsion), Meckel's

Diverticulum, Evisceration of the Bowels at the Umbilicus Ten Hours After Birth.

Dr. James W. Jameson, Meckel's Diverticulum. Dermoid Cysts.

Dr. James B. Woodman, Fractured Patella.

A delicious buffet lunch was served at the hospital and considerable time was given the men to sit around and talk to their companions, a very valuable part of the annual meeting of this Society.

At two o'clock in the Ballroom of the Carpenter Hotel, the following papers were read:

Malignancy of the Breast, Dr. H. Gildersleeve Jarvis.

Results in Mammary Carcinoma at the Elliott Hospital, Dr. George C. Wilkins, Dr. George F. Dwinnell—by invitation.

Secondary Carcinomata of the Large Bowel, Dr. Edward L. Young, Jr.

One Hundred Untreated Cancers of the Rectum, Dr. Ernest M. Daland.

Stones in the Common and Hepatic Bile Duct, Dr. Frank H. Lahey.

Obliterative Cholangeitis Involving the Extrahepatic Bile Ducts, Dr. Horace K. Sowles.

Surgical Complications of the Salmonella Suipestifer, Dr. Irving Walker.

Congenital Diaphragmatic Hernia in Children, Dr. Philemon E. Truesdale.

At five o'clock the members and their wives were entertained by Dr. and Mrs. David W. Parker at tea.

The eighteenth annual dinner was held at the Manchester Country Club. Eighty-three men sat at the table. After dinner the President, Dr. Peer P. Johnson, read an address and later introduced Mr. Henry Wise Wood who spoke interestingly and at some length concerning canoeing, sailing (the Cruising Club of America) and into the clouds by aeroplane and otherwise.

At nine o'clock on Saturday morning the members assembled at the Carpenter again and at the annual business session elected the following officers:

President: Daniel C. Patterson, M.D., Bridgeport, Conn.

Vice-President: David W. Parker, M.D., Manchester, N. H.

Secretary: John M. Birnie, M.D., Springfield, Mass.

Treasurer: James R. Miller, M.D., Hartford, Conn.

Recorder: Walter G. Phippen, M.D., Salem, Mass.

Executive Committee: Officers of the Society, Lucius Kingman, M.D.; Philemon E. Truesdale, M.D.; William H. Bradford, M.D.; Thomas W. Luce, M.D.; Lyman Allen, M.D.

It was announced that the next meeting would be held in Bridgeport, Connecticut.

Thereafter the following papers were read:

A Form of Sclerosing Osteomyelitis following Fractures of the Long Bones, Dr. Paul P. Swett.

Statics of the Foot in Relation to Surgery, Dr. Frederic J. Cotton.

DeQuervain's Disease and Carpal Ganglia, Dr. Daniel C. Patterson.

Certain Aspects of Hand Surgery, Dr. Torr W. Harmer.

Congenital Absence of the Pericardium, Dr. William E. Ladd.

Urologic Aspects of Vesicovaginal Fistula, Dr. William C. Quinby.

Acute Arterial Obstruction from Arteritis, Dr. Howard M. Clute.

Personal Experiences with Cancer of the Bladder, Dr. J. Dellinger Barney.

Reconstruction of the Vagina from a Portion of the Sigmoid; Report of a Case, Dr. Herman C. Pitts.

Everyone agreed that again a most interesting and instructive meeting had been enjoyed and that many thanks were due to the Manchester men for their thoughtful preparation. Over ninety men were present at the meeting.

HARVARD MEDICAL SOCIETY

The next meeting of the Harvard Medical Society will be held in the Peter Bent Brigham Hospital Ampitheatre (Shattuck Street Entrance), Tuesday evening, October 22, at 8:15 P.M.

PROGRAM

Presentation of Cases.

Some Experiences During a World Tour. By Walter B. Cannon, M.D.

MARSHALL N. FULTON, M.D., *Secretary.*

ESSEX NORTH DISTRICT MEDICAL SOCIETY

The Quarterly Meeting of the Essex North District Medical Society will be held Wednesday, October 23, 1935, at 1:00 P.M., at Peabody House, Andover Academy.

Business meeting will precede the luncheon which follows at Phillips Inn at 2:00 P.M.

Returning to Peabody House, discussions will be presented by each of the city committees on mutual local problems of the profession and the public.

Dr. Gaylord Anderson of the State Department of Health will discuss mutual problems of the Department of Public Health and the medical profession.

E. S. BAGNALL, M.D., *Secretary.*

NEW ENGLAND PHYSICAL THERAPY SOCIETY

The first fall meeting of the New England Physical Therapy Society will be held in Parlor C, the mezzanine, Hotel Statler, Boston at 8 o'clock in the evening of Wednesday, October 16, 1935.

PROGRAM

The Treatment of Hemorrhoids. Leland S. McKittrick, M.D., Boston.

Discussion will be opened by Vernon C. Stewart, M.D., Woburn, and William D. McFee, M.D., Boston.

Preceding the meeting there will be an informal dinner in the main dining room of the Hotel Statler at six-thirty. Those planning to attend will meet on the mezzanine.

Members please take note of the change of meeting place.

Physicians are cordially invited to attend.

WILLIAM D. MCFEE, M.D., *Secretary*,
Boston, Mass.

WORCESTER NORTH DISTRICT MEDICAL SOCIETY

The Worcester North District Medical Society will hold its next quarterly meeting at the State Colony in East Gardner, on Wednesday, October 23, at 4:30 P.M. Dr. Charles E. Mongan, President of the Massachusetts Medical Society, will be the guest speaker. Luncheon.

FRANCIS M. MCMURRAY, M.D., *Secretary*.

TRUDEAU SOCIETY

The meeting of the Trudeau Society will be held at Rutland State Sanatorium on Tuesday, October 15, 1935, at 4 P.M. Dr. Gulli Lindh Muller will read a paper on "Blood Studies in Relation to Surgery and Pulmonary Tuberculosis." Dr. Paul Dufault will discuss "Pneumolysis Failures With Illustrations." There will be a moving picture entitled "The Sanatorium." The meeting will be opened by Dr. John S. Harter of the Lahey Clinic. Lunch will be served at 6:30 P.M.

MOSES J. STONE, M.D., *Secretary*.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, OCTOBER 14, 1935

Monday, October 14—

9-10 A.M. Boston Dispensary, 25 Bennet Street, Boston. Endocrine Clinic, Case Presentations. Dr. Charles Lawrence.

Tuesday, October 15—

9-10 A.M. Boston Dispensary, 25 Bennet Street, Boston. X-Ray Demonstration. Dr. Alice Ettinger.

†12 M. The South End Medical Club, at the Headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston.

Wednesday, October 16—

9-10 A.M. Boston Dispensary, 25 Bennet Street, Boston. Ward Cases. Dr. S. J. Thannhauser.

†12 M. Clinico-Pathological Conference. Children's Hospital.

*8 P.M. New England Physical Therapy Society. Hotel Statler, Boston, Parlor C, the mezzanine.

Thursday, October 17—

*8:30-9:30 A.M. Clinic, Surgical and Orthopedic Staffs of Children's Hospital, at the Children's Hospital.

9-10 A.M. Boston Dispensary, 25 Bennet Street, Boston. "Vital Statistics and Medical Statistics." Dr. E. B. Wilson.

*3:30 P.M. Medical Clinic at the Peter Bent Brigham Hospital.

Friday, October 18—

9-10 A.M. Boston Dispensary, 25 Bennet Street, Boston. Ward Cases. Dr. S. J. Thannhauser.

Saturday, October 19—

9-10 A.M. Boston Dispensary, 25 Bennet Street, Boston. Tuberculosis Clinic. Dr. S. J. Thannhauser.

*10-12. Staff rounds at the Peter Bent Brigham Hospital.

*Open to the medical profession.
†Open to Fellows of the Massachusetts Medical Society.

October 11—Massachusetts Memorial Hospitals, Surgical Section. See page 738.

October 11—Boston University School of Medicine Surgical Clinic at the Boston City Hospital. See page 738.

October 11-31—Boston Dispensary. Medical Conference Programs. See page 738.

October 14-19—Inter-State Postgraduate Medical Association of North America. See page 649, issue of September 12.

October 15—Trudeau Society. See notice elsewhere on this page.

October 15—South End Medical Club. See page 698, issue of October 3.

October 16—New England Physical Therapy Society. See page 739.

October 17—Medical Clinic at the Peter Bent Brigham Hospital. See page 737.

October 21 - November 2—1935 Graduate Fortnight of the New York Academy of Medicine. See page 898, issue of May 9.

October 22—Harvard Medical Society. See page 739.

October 28 - November 1—The Twenty-Fifth Clinical Congress of the American College of Surgeons. See page 1065, issue of May 30.

DISTRICT MEDICAL SOCIETIES

ESSEX NORTH DISTRICT MEDICAL SOCIETY

October 23—See page 739.

WORCESTER DISTRICT MEDICAL SOCIETY

November 13—Wednesday evening. Grafton State Hospital, North Grafton, Mass. Dinner and scientific program. Subjects of program to be announced later.

December 11—Wednesday evening. St. Vincent Hospital, Worcester, Mass. Dinner and scientific program. Subjects of program to be announced later.

January 8, 1936—Wednesday evening. Worcester City Hospital, Worcester, Mass. Dinner and scientific program. Subjects of program to be announced later.

February 12, 1936—Wednesday evening. Worcester State Hospital, Worcester, Mass. Dinner and scientific program. Subjects of program to be announced later.

March 11, 1936—Wednesday evening. Memorial Hospital, Worcester, Mass. Dinner and scientific program. Subjects of program to be announced later.

April 8, 1936—Wednesday evening. Hahnemann Hospital, Worcester, Mass. Dinner and scientific program. Subjects of program to be announced later.

May 13, 1936—Wednesday afternoon and evening. Annual Meeting of Society. Time, place and details of program to be announced in an April issue of the Journal.

ERWIN C. MILLER, M.D., Secretary.

WORCESTER NORTH DISTRICT MEDICAL SOCIETY

October 22—See notice elsewhere on this page.

BOOK REVIEW

National Medical Monographs. Obstetrics for the General Practitioner. J. P. Greenhill. 304 pp. New York: National Medical Book Company, Inc. $3.00.

This volume, in the series of National Medical Monographs, aims to present a survey of the field of clinical obstetrics in sufficiently compact form to be available as a manual for the busy practitioner. No attempt is made, therefore, to discuss the anatomic and embryological aspects of the subject. Beginning with prenatal care, the principal topics considered are those of abortion and miscarriage, premature labor, ectopic pregnancy, the toxemias and other complications of pregnancy, the management of normal labor, forceps delivery, Caesarean section, anesthesia, infections, and postpartum care. It is surprising that podalic version is dismissed with only the briefest description. One may also question the categorical statement that "low cervical Caesarean section is far safer than the classic operation". The volume is well illustrated with a series of thirty-nine cuts from DeLee's "Principles and Practice of Obstetrics."

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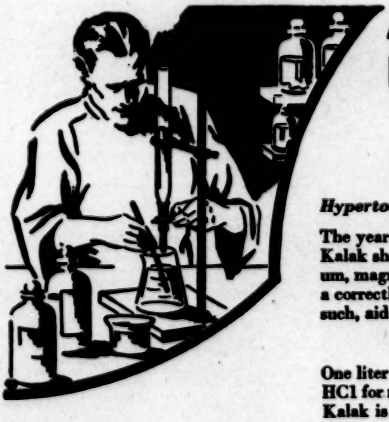

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Clinical Background of Dextri-Maltose

Continued down from 1911

1922

In marasmus, "When the stools have become smooth and salve-like, carbohydrate, in the form of dextri-maltose, may be gradually added up to the limit of tolerance."—*L. W. Hill: Practical Infant Feeding, W. B. Saunders Co., Phila., 1922, p. 281.*

1922

In spasmophilia "Dextri maltose is the best sugar to use in these cases, in the proportion of 6 to 8 per cent."—*J. H. Reading, Jr.: Spasmophilia, Hahneman. Monthly, pp. 403-411, July 1922.*

1922

In pylorospasm, "Before the food is given, the stomach is carefully washed until the washings return clear. The food is then given through the tube before it is withdrawn. The food given in these instances is practically always a mixture of albumin milk and a dextrin-maltose combination, a quantity sufficient to meet the needs of a child of like age and weight without gastro-intestinal disturbance."—*C. G. Grulee: Treatment of pylorospasm in infants, J. A. M. A. 78:1183-1184, April 22, 1922.*

1922

"Malt sugars are of value and are better than milk sugar in increasing nutrition and adding weight."—*W. L. Carr: A group of difficult feeding cases, Arch. Pediat. 39:715-719, Nov. 1922.*

1922

In pyloric stenosis, "With low dextrose tolerance, a maltose dextrin preparation may be added in whole or in part. Even where the dextrose is well tolerated and gain in weight has ceased, impetus to the weight ontake may be given by the addition of a maltose dextrin preparation."—*D. J. Levy: Pyloric stenosis and pylorospasm of infancy with especial reference to medical treatment, J. Michigan St. M. S. 21:166-170, April 1922.*

1922

"In giving careful study to the digestive peculiarities of marasmic infants note clearly two outstanding features: an intolerance of fat and an unusual capacity for appropriating nourishment from maltose."—*G. B. Parramore: Malnutrition, Med. World, 40:143, April 1922.*

1923

"Green stools usually occur as a result of fat or carbohydrate indigestion. In such cases the fat and sugar should be given in low percentages and gradually increased. Dextri-maltose is the preferable sugar to employ."—*W. N. Bradley: Feeding the new-born infant, Therapeutic Gazette, Jan. 15, 1923, pp. 17-25.*

1923

"Theoretically, milk sugar should be our choice, but the average commercial milk sugar is often far from what it should be and often we get a very impure product, so I find a great many children who do not handle milk sugar very well. Dextri-Maltose sugar has become very popular in recent years and is easily digested as a rule and agrees with a great many infants who cannot handle milk sugar or cane sugar."—*W. L. Harris: Simplified infant feeding, Southern Med & Surg. 85:194, April 1923.*

1923

"The young babies are started upon a weak mixture, usually one-third milk, which is occasionally skimmed at first, and a half ounce of sugar. We prefer Dextri-Maltose as the carbohydrate most easily digested. . . . Preparations containing the more maltose are more rapidly absorbed, but on the other hand, are more liable to produce diarrhea. . . . Lactose which was very popular at one time, is never used in our work. The consensus of opinion seems to be that milk sugar is often a source of indigestion in normal infants and the primary cause of fermentative dyspepsias in many instances."—*J. H. Reading, Jr.: Artificial feeding of the normal infant during the first year, Hahneman. Mo. 58:227-233, April 1923.*

1923

"We also know that decomposed food and foods rich in sugar (particularly cane and milk sugars) are instrumental in bringing about a toxic state."

". . . I have used with good success, skimmed milk (boiled 10 minutes) together with buttermilk, or bacillus bulgaricus in the culture or tablet form, gradually replacing the skimmed milk with whole milk, and slowly adding some form of malt sugar, such as Dextri-maltose, up to 5%. In some cases where the child had, previously to the acute attack, been poorly nourished, and where subsequently there had developed a state of intestinal decomposition, I have used albumin milk with Dextri-maltose beginning with a 2% solution and increasing gradually to a 5 or even a 7% solution."—*E. W. May: Treatment of alimentary intoxication and report of cases, J. Michigan St. M. S. 22:14-16, Jan. 1923.*

1923

"If colic is due to lactose indigestion, Dextri-Maltose should be added to the formula, as it does not ferment so easily as sugar, and is more readily assimilated."—*R. C. Ferguson: A few suggestions in difficult feeding cases, Texas St. J. M. 19:243-245, Aug. 1923.*

1923

"When the baby becomes abnormal, when it has a digestive disturbance and especially one of a fermentative nature, one's attitude toward the various sugars is materially changed. It seems well established that in these conditions milksugar, and also cane sugar, are less well tolerated than are the dextrin-maltose preparations. . . . Because these carbohydrates are better tolerated in all cases with a tendency to diarrhea of fermentative origin, and can be given sooner and in larger amounts during convalescence without danger of a return of the diarrhea, they have almost completely replaced the other sugars in the treatment of these conditions, and are always used in the special preparations such as Eiweiss milch that were devised to meet this indication. A further advantage in the use of dextrin-maltose preparations lies in the fact that, it is commonly of benefit to use two or more carbohydrates in an infant's food for reasons that will be considered later. When we add dextrin-maltose to a food we have three carbohydrates represented, milksugar, dextrin and maltose, that have a different chemical and bacteriological behavior in the intestine and have different rates of absorbability."

"Milksugar is changed into dextrose and galactose; cane sugar into dextrose and levulose; while maltose is split up into two molecules of dextrose. Dextrins are first converted into maltose and then into dextrose. The starches are first changed into dextrins and then into maltose and finally into dextrose. The disaccharides and the polysaccharides, like starch, are not absorbed as such while all the monosaccharides are. They seem, however, to differ in the readiness with which they are absorbed and utilized in the body and also differ in their fermentability in the intestinal tract. Dextrose is the least easily fermented and the most readily absorbed of the monosaccharides. It is moreover the normal constant sugar of the blood and can, therefore, be utilized at once without first being stored as glycogen in the liver. The levulose and galactose, which form half of the intestinal end products of cane sugar and milksugar respectively, are said to be more readily fermented and less readily absorbed, and must first be changed into glycogen and later into dextrose before they can be utilized in the body. This would seem to offer an explanation for the clinical experience that dextrin-maltose preparations are more acceptable to atrophic, or marantic babies, to weak babies with digestive disturbances, and to all cases in which there is a tendency to fermentation. Maltose for chemical and commercial reasons has not been available for infant feeding and is never used alone. It is always combined with dextrins which represent an intermediate stage in the conversion of starch into maltose. In fermentative disorders this is of considerable advantage, as we know clinically, probably because the simultaneous and more gradual conversion of dextrin into maltose, and maltose into dextrose, leaves less of the dextrose at any one time to undergo fermentation. It may also be of value for osmotic reasons. This probably offers a further explanation why starch is so often added with advantage instead of more sugar, because the digestion of starch requires a still further step, the conversion into dextrins."

"In terms of the kitchen one can begin with two to four level teaspoonfuls and gradually increase the amount up to six or eight or ten level teaspoonfuls in the total mixture. The dextrin-maltose preparations can commonly be used in much larger amounts, up to three or four tablespoonfuls."—*I. A. Abt: Pediatrics, W. B. Saunders Co., Phila., 1923, vol. 2, pp. 614-616, 620.*

1923

"Milk-sugar, which has been so extensively used in the past, should never be used where there is any digestive disturbance. It is not as easily digested as either cane-sugar (granulated sugar) or dextri-maltose. The latter is the best of all sugars to use, especially if there is any tendency to looseness of the bowels."—*A. Brown: The Normal Child; Its Care and Feeding, F. D. Goodchild Company, Toronto, 1923, p. 180.*

1923

"In two or three days, when the condition has improved as evidenced by fewer bowel movements and a difference in their character, sugar in the form of dextrimaltose is gradually added."—*C. M. Pounders: The diarrheal diseases of infants and children, J. Oklahoma St. M. A. 16:245-249, Aug. 1923.*

Continued down to 1934

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